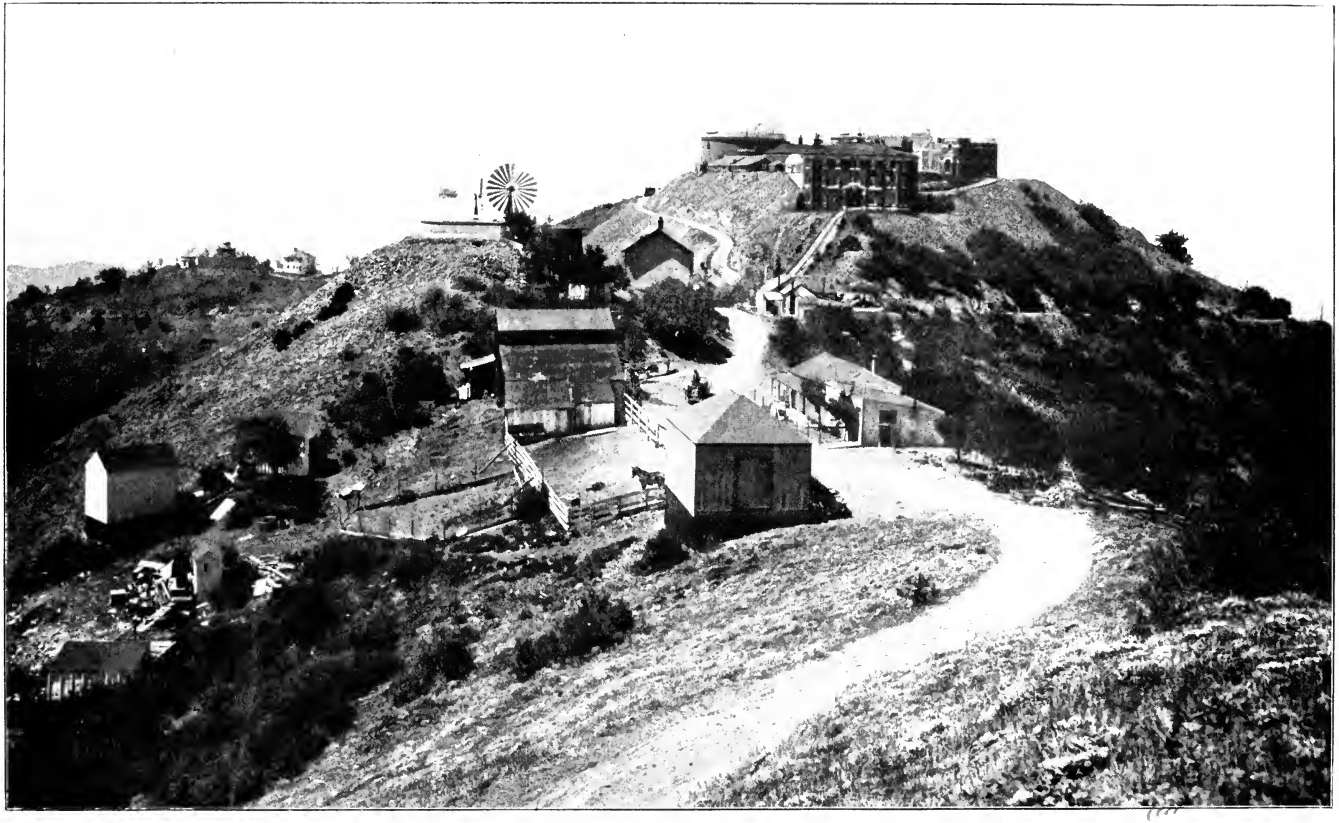
THE Procession of Planets

ERRATA.

The second note under Fig. 29 on page 133 should be under Fig. 5 on page 29. On page 80 the large figure 1 under the title of the chapter should be omitted.



View of Lick Observatory on Mt. Hamilton

The Procession of Planets

A RADICAL DEPARTURE

FROM

Former Ideas of the Processes of Nature

SHOWING THE TRUE MOTIONS
OF MATTER

— BY —
FRANKLIN H. HEALD

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PREFACE.

This book is not intended as a textbook on astronomy as much as an attempt to correct some of the mistakes of astronomers. It shows the true motions of matter as they force themselves along the lines of least resistance. It shows the opposite force to gravity, which Newton overlooked, and which is expansion caused by heat. It shows that there are but these two forces, or causes of force, (gravity and heat) in nature and that they are self operating.

It teaches that there is always a procession of expanded matter or gas, going up from the sun and a returning procession of planets, moons, comets and other solid matter, falling back to the sun, which keeps it supplied with fuel and energy.

It furnishes the mathematical proof of such a procession in our solar system, by pointing out the facts concerning their relative distances from the sun, and their speed along their orbits, all of which astronomers have measured and proven.

It teaches that all motions are related and governed by the same laws; that suns are traveling around each other, with their solar systems and falling toward each other in binary systems; that binary systems are traveling in galaxys, and that all is system and order as forced by the motions of all matter and that it could not be

otherwise without a mind or intent or purpose to interfere.

I have taught this theory since 1899 and have published a magazine, Higher Science of the Motions of Matter, since 1900 to teach the theory. My teaching has been accepted by all who have studied it—except astronomers and scientists who belong to societies and associations teaching other theories and depending upon such societies and associations for their standing or support. I do not complain of them. I appreciate the fact that they cannot depart from the theories and hyotheses which they are taught, without losing the support of the institutions or societies to which they belong and from which they hold diplomas or from which they have influence, and am therefore satisfied to know that the theory of a procession of planets proves itself to be correct. I do not expect it to be generally accepted by the present generation of scientists, for the reasons given.

I.

FORM AND MOTION.

Matter has three forms; solid, liquid and gaseous, and two motions, expanding and contracting. All the motions of matter and all the forms and phenomena of matter and nature are made by the expansion and contraction of matter by heating and cooling; or, by different degrees of heat.

Water takes up the least room when it is in the solid form; when it is in a crystallized state its atoms are lying between straight parallel lines. When 32 degrees of heat are added, its bulk is increased and it becomes a liquid; and when the heat is increased to 212 degrees it becomes a gas and occupies 1730 times the space it occupied as a solid. So all matter increases in bulk as it is heated; and upon its specific gravity or weight, depends its increase in bulk as it is heated. To illustrate: one cubic foot of water weighs 40 pounds when solid, while one cubic foot of gold weighs 2000 pounds, or fifty times as much. The weight is not changed by expanding into gas, but the space occupied by a cubic foot of gold when expanded into gas, is fifty times as great as a cubic foot of water when expanded into gas, or, $1730 \times 50 = 86{,}500$ feet.

It has been estimated that average matter expanded into gas, occupies about eleven thousand times more space on the earth, than solid matter; but we must not overlook the fact that it is under the pressure of the air and that the farther we leave the earth, the more space

Fig. 2.—Mount Hamilton and the Lick Observatory. This world-renowned astronomical observatory, in Santa Clara county, is due to the beneficence of James Lick, a California pioneer. There is a grand view from the summit.

the same weight of gas will occupy, until we get beyond the weight of the earth's atmosphere; and then the farther we go from the sun, the more space the same weight will occupy, until we reach the half way point of gravity to the nearest sun. All space between the suns must be occupied by expanded matter, because as long as there is space to be filled, matter will expand to fill it, for the reason of the expansion of heat at the nearest sun below (provided it is the same size as the next one). The reason for this is that the gas at the sun below must

hold the gas above, up as far as it can; and when it meets the gas from the next sun, where upward expansion from the two are equal, of course it can go no farther. Gas is composed of spherical atoms, each one from the sun, held up and forced up, by pressure from the next one below, so that it is easy for us to perceive that a column or pile of these atoms has weight; and the force of expansion by heat at the sun must force them up and hold them there till they become cold enough to contract into liquid or solid matter, when they begin to fall again, by gravity, to the sun or center from which they expanded.

These two opposite forces, expansion and contraction or heating and cooling, keep matter in ceaseless motion. The force of heat is forever disintegrating matter and pushing it up or away from the sun, expanding and increasing its bulk, and the force of gravity or contraction is forever separating it into its elements and contracting its bulk again, back to the sun. If there was only the force of heat in nature, all matter would be expanded into space as gas, never to return; and if there was only the force of gravity or contraction in nature, all matter would finally be contracted into one vast body, never to be distributed again. In either case, all would be silence and death, as there would be no more motion, which is life. We might say that heat is the life of matter and gravity the death of matter, but for the fact that matter must expand before it can contract and must contract before it can expand; therefore it is always in motion or living. When solid matter separated into its various

elements, is returned to the sun by falling or gravity, the friction of its disintegration or chemical dissolution, and its reuniting or fluxing into one element again, together with the collision of its fall or concussion—made by stoppage of its motion—causes the same amount of heat that it originally cost the sun to expand it into gas. There is and can be no loss of matter or force in nature. If we shoot a cannon ball against a solid iron wall which will instantly stop it, we find it will be instantly heated to the exact amount of heat or force used to fire it after deducting the amount of friction in the air or medium thru which it travels from the cannon's mouth to the wall; and this friction will not be lost, because, in the economy of nature, it expands the medium, air, thru which it passed.

When Sir Isaac Newton discovered the force of gravity or contraction, by wondering why the apple fell to the earth instead of into the sky, if he had wondered also how it came to be in the tree-top, he would have discovered the law of heat-expansion, the opposite of gravity, or the other great force in nature. It was the force of expansion by heat, acting on the soil which sent the sap up thru the pores of the tree, to the apple blossom to build the apple; and it is the same thruout all nature; the force of heat or expansion can never hang an apple so high that the force of gravity, cooling or contraction, will not find and bring it down. Neither can it send matter so far up into space that gravity cannot collect it, separate it into its elements and return it to the sun. It

is the force of expansion by heat which expands or evaporates the water of the sea into colorless vapor (gas of water) and sends it over the mountain tops; but it is the force of gravity or contraction which condenses it into clouds and raindrops and brings it down again to refresh the earth. It is an adage of antiquity that "what goes up must come down," meaning there can be no loss in nature. It is the force of heat-expansion which swells

Fig. 3.—View of the San Gabriel Valley, from Mount Lowe railway. This unique cable incline and electric road carries the visitor, at midwinter, within a couple of hours, from roses and oranges to snow, through forests of pine.

or lightens the atmosphere and forces it away to melt the ice and snow of the frozen north; but it is the force of gravity which condenses it by cooling and brings back the cold north wind. It is the force of heat or expansion which sends the upper currents of the sea flowing north or south to either pole, taking the place of the cold (condensed) water which flows back underneath where the

water is heavier. It is the force of heat generated by the friction of decay or chemical decomposition of food in our stomachs that warms our blood, feeds our tissues, muscles and nerves, and sustains our life; but it is the force of gravity or contraction that collects the substances, condenses and ossifies the bones, muscles and tissues, finally bringing the ripeness and wrinkles of old age and death. What we call chemical force is the heat generated by the friction of chemical action in the dissolution of various elements of matter into larger bulk that causes force. In the rotting of the log as in its burning, it is the uniting of the carbon of the log with the oxygen of the air or water that causes its expansion into gas, and this distended, gaseous bulk of the log may represent force in heat, light, electricity or other motion. Just as much heat, and just as much gas is developed by the log that rots away in five or fifty years, as by the log that burns in five minutes. In fact we can make thousands of combinations of elements so readily and with such rapidity, as to cause explosions.

When matter returns to the sun (as solid matter) crystallized into separate elements, and is expanded into gas tens of thousands of times its bulk when solid, and is swelled up into space, it is composed of a perfect mixture of all the elements in matter and nature; but when it has been forced up into the intensely cold regions of space where it contracts into solid matter and gathers into worlds, it separates again into different elements such as water, air and various minerals, as it goes thru its evolu-

tions returning to the sun, thus storing force to be again released at the end of its journey. It is the chemical reuniting, then of these elements which gravity has separated and brought back to the sun in shape of planets, moons, asteroids, comets, meteors and cosmic dust, which causes the chemical friction and concussion necessary to furnish it with a never ending supply of energy and heat. As it is swelled into gas at the sun by heat we find it to be composed of a complete admixture of all matter in the proportion it exists in nature, carrying the life, expansion, and buoyancy of youth. Each atom of its substance or gas, also carries with it all the motions of that part of the sun from which it separated, which are also the original startings of all the motions of the terresterial bodies. So it is all thru nature; we must look to these two original forces, expansion and contraction or heating and cooling, always in opposition to each other, for an explanation of all motion and phenomena. They will surely give it when rightly interpreted. What they do, however, is only temporary; because what one is doing the other is as industriously undoing; and thus in the chapter following we shall see that there is a continual outpouring of matter and energy from the sun, in every direction thru space, and a continual returning of this matter and energy, guided by the minor forces in the great circling orbits of its planets, moons and other bodies. "What goes up must come down"; and, as expanded matter is always going up from the sun, it will never cease to come down, until the sun itself comes down

to its own binary companion sun, when their great speed and necessary development of heat and expansion, will destroy their centers of gravity for each other and again force them apart by centrifugal force and expansion of heat, to their greatest limit, after which the whole process of their planetary systems will commence over again.

This discovery of a procession of planets is simply that the substance of the sun is being constantly expanded into gas, of tens of thousands of times greater bulk, and being composed of the same materials which was decomposed to make it, is cooled and crystallized into cosmic dust as the heat leaves it and it reaches that region of intense cold beyond Neptune where it must contract into solidity.

Lockyer's Elements of Astronomy, Note 101, says:

> In note 48 the marked character of the distribution of stars (suns) of our universe, giving rise to the Milky Way, was pointed out. The distribution of the nebulae, however, is very different; in general they lie out of the Milky Way, so that they are either less condensed there, or the visible universe, as distinguished from our own universe, is less extended in that direction. They are most numerous in a zone which crosses the Milky Way at right angles, the constellation of Virgo being so rich in them that a portion of it is termed "the nebulous region of Virgo."

Please notice that at right angles to the Milky Way, is on the plane of the sun's equator and exactly where we must expect to find the condensed crystals of this expanded gas where new worlds should be forming.

The same authority, Note 7, says:

> Far away, and comparatively so dim that the naked eye can make little out of them, lie the nebulae (from Latin nebula, meaning cloud)

so called because in the telescope they put on strange cloudlike forms. They differ as much from stars as comets differ from planets.

In Note 100, under the head of Variable Nebulæ, he says of them:

> The phenomena of variable, lost, new, and temporary stars have their equivalents in the case of nebulae, the light of which it has been lately discovered (twenty-five years ago) is in some cases subject to great variations.

Thus we see they are not still; are in motion and no doubt in a crude condition of rotation.

Fig. 4. The Negatively charged Nebula A, is supposed to cause rotation in B by Electrical Attraction.

At this point, and under the existing condition of gas condensing into crystals (which continue the motions given the atoms of gas by the sun), we can readily see they would gradually gather into larger and larger bunches, slowly rotate and revolve around the sun (about once in twelve hundred years providing they had still the same speed with which they left the sun's equator) until a foundation was laid for a new planet which would gradually gather by attraction until it had fallen so far

from these higher regions that it would only attract satellites. Then another world would commence to form, and the last one cease to collect matter (except its moons as they fall to it one by one). After billions of years the planets again return to recruit that great chemical center of heat, life and light, after having passed thru their many stages of evolution: from a loose cloud of crystals of cosmic dust to a dismembered stream of fragments dropping into the sun; (having gathered their moons from the space above them) passing thru the fires of friction (generated by their grinding sand); melting by the immense heat thus generated; burning, melting and radiating much of their weight away until they reduce their size to that of second class planets; occasionally one bursting at this dangerpoint into asteroids; cooling and forming their crusts; evolving life (first plants and then on up to man); dying and turning one of their poles to the sun; increasing their speed to such an astonishing rate that they gradually go to pieces and fall into the sun, that great central rejuvenating caldron of heat where they are chemically dissolved to be again sent up beyond the orbit of Neptune to make the same long journey.

There are a multitude of reasons proving that the formation of worlds begins in the space above Neptune who swings in his mighty orbit three billion miles above the sun. Half the distance to the nearest sun, Alpha Centura, is 12,500,000,000,000 miles and all within that space should be within our sun's attraction. All matter leaving the sun carries every motion of the sun with it,

no matter if it is the smallest subdivision of matter. It has these motions when a part of the sun and therefore can never lose them in space where there is no resistance to their action. If the planets were thrown out of the sun in a body, as has been supposed, scientists would not hesitate to admit that they would retain the motions of the sun. They would admit it no doubt, if the body weighed but a thousand tons, or one ton, or one ounce. In fact at what subdivision of matter can the motion change? Must we not admit that the atoms of gas retain the motion of the sun, the same as they would if the size of a moon? As these atoms crystallize into dust and collect into worlds, it is a collection of motion as well as of matter because the motions of all the atoms are alike and therefore the new worlds could take no other motion than that from west to east which, we will see, is the inherent motion of matter; inherited by all the bodies of the solar system from their parent the sun, which in turn inherited its motion from the unknown body from which it came. Suppose we set a top spinning; if we give it a little swing as the string comes off, we give it two motions, the rotating motion of spinning, and the orbital motion it observes in its circles on the floor. Now if we could throw it into space (where there was no resistance) it would go on making these motions until drawn to the nearest body or the one over which it would fall.

All matter seems to move naturally from west to east, and when we find a body moving or rotating from east to west, it is only temporary. This is why the suns, planets,

moons and asteroids rotate and travel in their orbits from west to east, it is why storms and storm centers travel in a circle or orbit from west to east. It is why soaring birds travel from west to east. All vines wind up a stick or string from west to east, and will not be forced to grow otherwise. It is the inherent motion of matter which causes us to whirl and make an orbit in this direction in the ballroom. Blindfold a person and he will invariably make an orbit in this direction. We pass each other on the street the same way; races are run on the track the same way and even machinery set to turn against this law of nature, will wear out sooner or refuse to give satisfaction. Nature does not make motions by chance; it has no changing mind, but to understand its motions we must use less mystery and more reason.

The Nebular Theory of the formation of the solar system is, that it was once a single revolving mass of nebulous matter with its center where the sun is located; that one at a time this immense revolving mass threw off rings by contracting the balance of the mass, leaving the ring which then pulled itself together by some unknown means and made a world. The figure shows a circle around the sun 6,000,000,000 miles in diameter or 18,000,000,000 miles in circumference; the latter distance representing the outside rim of the original nebula. We can readily see that a point on the outside rim would have to travel this great distance while the sun or hub turned once, which would be in twenty-four days. Neptune would be the first planet formed as it is farthest away and would have

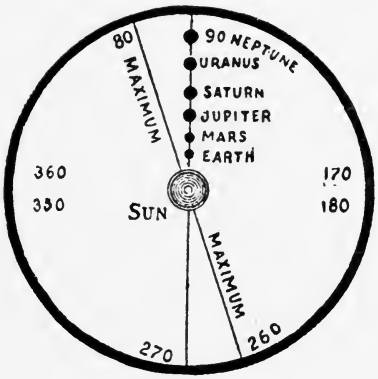


Fig. 5.—Nebular Theory.

See note p. 133.

to come off first. One at a time the planets were supposed to have been thrown off till there was nothing left but the sun, and it is gradually wasting away and capable of lasting but 5,000,000 years longer.

According to this hypothesis, this mass revolved on its axis 18,000,000,000 miles in twenty-four days, or at the enormous speed of 750,000,000 miles per day; and this is the time Neptune would have to be making on his orbit, in order to carry out the nebular theory. Each ring left off later would have to travel more slowly still because

nearer the axis or pole of the mass; and when we reached Mercury, we would find it making the slowest time of all the planets, instead of the fastest as it does. Neptune travels but 250,000 miles per day and each one travels faster as we come nearer to the sun; Mercury traveling 2,500,000 miles per day, or ten times as fast as Neptune, thus exactly reversing the order of speed required by the nebular theory or hypothesis.

Again: according to the nebular theory the oldest planets should be farthest from the sun, having necessarily been the first ones thrown off, whereas facts show the reverse in this respect also, and we find by the means of spectroscopic photography, density and temperature, that the youngest planet is Neptune and that each one is older than its outside neighbor and younger than its neighbor next towards the sun.

Aside from all this, there is the impossibility that a ring of matter traveling around an orbit could ever gather into one body. It would be an impossibility; because, each individual particle of the ring would have the same motion and must of necessity continue in the same relation to each other, unless it shortened its orbit, in which case the particles would only approach each other as the ring became shorter, and could never concentrate into one globular mass. The rings of Saturn are good evidence of this; they do not show any attempt at forming a sphere, but simply approach each other as the orbits shorten.

The nebular theory does not provide any supply whatever for the maintenance of the sun's energy, but leaves

it to finally contract to nothing and disappear. If the sun is contracting and radiating itself away, the gas of its expanded matter must go somewhere; it cannot be lost; and, what goes up must come down.

II.

LIGHT, HEAT AND ELECTRICITY.

Sir Isaac Newton believed light to be composed of minute, disintegrated particles traveling thru space at the speed of 183,000 miles per second. There is another theory of light; the undulating theory which is, that all space is filled with ether; and that light travels thru it as waves travel from a center in every direction; as for example waves from a stone thrown upon the surface of still water.

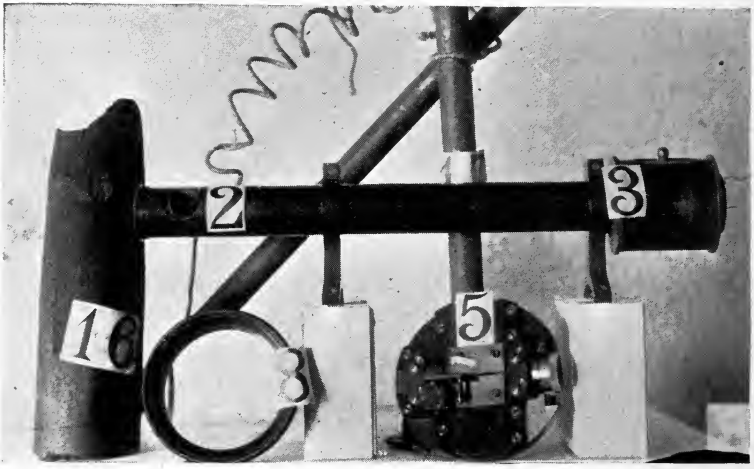


Fig. 6.—Fig. 2, 3, Electric Lantern for Micrometer Illumination; Fig. 5, Slit of Spectroscope; Fig. 8, Collimator Lens; Fig. 16, Searchlight Carbon—3,000,000 candle power; Fig. 17, Two ordinary city Arc Light Carbons.

This last theory seems to be much more reasonable, except that its advocates do not seem to know the nature of what they call "ether" and which they evidently do not consider substance.

Since publishing the first and second editions of the Procession of Planets, having had more time to experiment and consider these motions, I find them to be simply the jar running thru the gas of expanded matter which, we see, fills all space. It would not be possible for such a small atom of matter to travel at so great a speed as 183,000 miles per second; but it is perfectly reasonable that the impulse or jar should do so.

Let me illustrate it in this way: suppose we have a gun barrel twenty-four inches in length, and we fill it with one hundred bullets, each one-fourth of an inch in diameter. Now if we push one more bullet in at the breach of the gun barrel, the one at the muzzle will drop out instantly; and would do so no matter how long the gun barrel, provided it was filled with bullets. Each individual bullet traveled but one-fourth of an inch; yet, the impulse, or force, traveled as far as there were bullets touching each other, inasmuch as each must move the one in front of it away. The movement or impulse which is the result of force, applies to light, electricity, thot, heat, etc.

Let us suppose there are 39,000 of the atoms of expanded gas of matter in one inch in length, or 229,806,720,000,000 in a line between the sun and earth; when another atom is added at the sun end of the line by ex-

pansion of solid matter, it must have room, therefore it pushes the atom in front of it away from the sun the width of its own diameter. That one pushes the next, and each one in the line pushes the one in front of (or above) it, the same distance because they must all have room; each atom moving away from the sun only the width of its own diameter, yet the combined movement amounts to 93,000,000 miles.

This movement may be illustrated more simply, perhaps, if we use an iron rod instead of bullets. If we push the iron rod one inch from the sun at that end, the end at the earth will also move one inch from the sun. No single inch of the rod has moved more than one inch and yet, 93,000,000 miles from the sun, the rod moved one inch and exerted the same force that was applied at the sun.

In the case of light, heat, electricity, etc., it requires eight minutes for the force or impulse to reach the earth; while in the case of the solid rod, the transfer of motion might be instantaneous.

This tardiness of light may be accounted for upon the hypothesis that the atoms of expanded matter are more elastic than the atoms of the iron bar; requiring that much more time to take up the "slack" in the long line or ray of atoms; but it is more likely because they lay loosely in this vast sea of atoms (arranged like honey comb cells) and not being directly in front of each other, they would have a sidewise motion or vibration peculiar to advancing light.

When each new atom is added at the sun, which must

be with lightning rapidity, the whole line or ray, and in fact, the whole sea of atoms in space must vibrate or jar. If the ray of atoms was confined in a line and perfectly rigid, then perhaps the impulse would be instantaneous. It is just as impossible for one of these infinitesimal atoms of gas to travel 183,000 miles a second, as it is for the impulse to do so in space devoid of atoms of gas to communicate the impulse.

Electricity travels the same way; and, more than likely, is a degree of heat or force. These motions are in fact, closely related, interchangeable forms of force. We can make either one of them from either one of the others, by employing different kinds of resistance. We may transmit force for hundreds of miles over a wire from a dynamo (where force is applied) to a motor where the work is being done. When the force required to do the work at the motor is more than the force applied at the dynamo, the motor will "stall;" and at the same time the dynamo will stop; exactly as if a belt were running between them, carrying the force.

The reason that sunlight is hot in the atmosphere, is because its motions of vibration meet with more resistance than outside of it. If we go on the top of a high mountain, the sunlight grows cooler as the pressure of the air grows lighter, although we have been traveling towards the sun.

Some scientists claim there is only darkness and absolute zero outside of the atmosphere. This could not be true, because the motion of light could not be trans-

mitted if there was not gas for it to travel thru by vibrating it; and where there is any motion, there must be some heat.

The spectroscope is showing us many startling new things about light and force, one of which is that force is the foundation of all the motions we call heat, light, electricity, thot, sound, and even life itself. The spectroscopic photograph of a man's head, taken in the dark, shows a halo of light around it, more especially if he is thinking. The more intently he is thinking, the plainer the light. This proves that thot is a force; heat or electric, and kindred with the other forms of force. Growing plants develop heat; and the spectroscope can photograph this heat as light that human eyes can see. There is little doubt that some animals, cats for instance, and some birds, such as owls, locate their prey in the dark by this light. The Will-o'-the-wisp is a motion of light, thrown off by the growing or decaying of plants in a swamp. Fox-fire is the force of a rapidly growing fungus or plant, upon the heat of a decaying log or stump; and there are many such examples of force in nature, awaiting only explanation by means of careful investigation.

A great amount of time is wasted, or at least used, in discussing such questions as "Is there any light beyond the atmosphere?" I have also heard long debates on the question of whether there is or is not any sound where there is no ear to hear it. If there is light in space between the sun and the earth, it could not be seen unless there was an eye to see it, i. e., a retina for it to vibrate

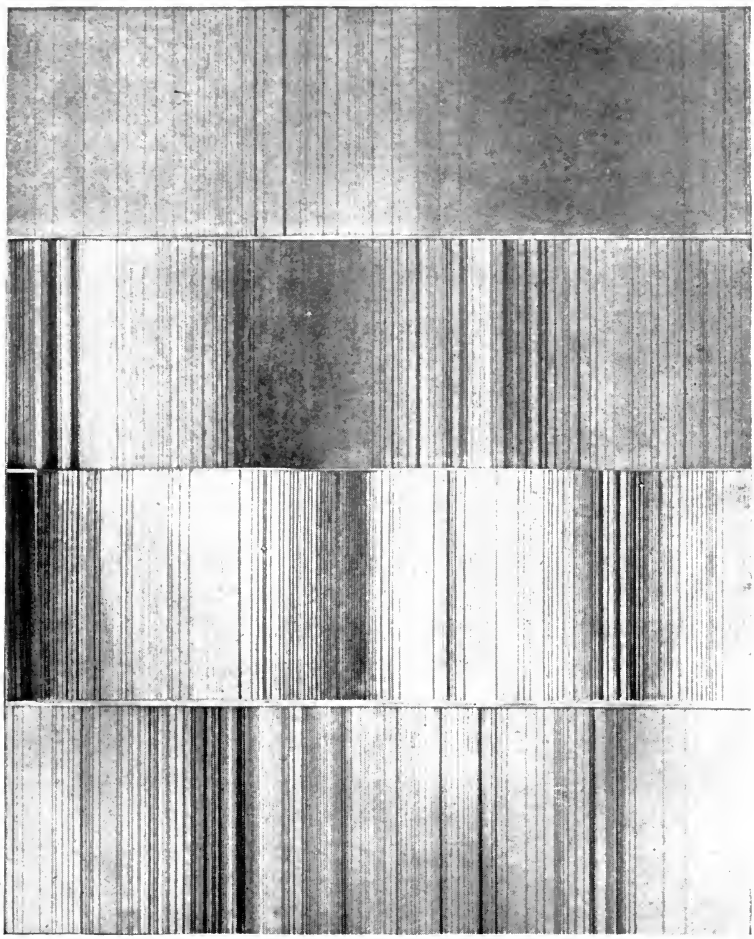


Fig. 7.—Professor Langley's Infra Red, or Thermal Spectrum. The stripes should be placed end to end.

upon; therefore we will never be able to see it personally, tho we may be sure the force is there, just as it is in the wire between the motor and dynamo; and just as it is in the belt which runs between the engine and the mill.

As we have seen under Form and Motion, heat-expanded matter fills all the universe of endless space; and there can be no vacuum in nature. There are centers of matter, but up from these centers the surrounding gasses simply become less dense and more sensitive. They never disappear. They could not disappear; because, like dividing ten by three, there would always be a remainder. If there was no gas of expanded matter filling the entire space of the universe, the motion of heat, light, electricity, sound or any other force could not reach us from the sun or from the other suns, millions of times as far away. There must be a substance to be agitated, or this motion, jar, vibration or impulse of force could not be transmitted. Neither of the motions can pass thru an artificial vacuum. In experimenting with liquid air, it is found by placing it in a bottle, inside of a larger bottle, with as near a vacuum as can be had between, that almost no heat can reach it; and it can be thus kept in a liquid state for as many days as hours formerly.

At the surface of the earth, where air has a weight (or pressure) of 14 pounds to the square inch at sea level, one cubic foot of water will make 1730 cubic feet of gas of water or vapor. This expansion is caused, of course, by heat. The more specific gravity an element has, the

more heat it requires to expand it into gas and the more space it occupies. Gold, for instance, is many times heavier than water; and the bulk of a cubic foot of gold, when changed into gas by heat, would be just as many times as great as a cubic foot of water changed into gas, or vapor, by heat. The less heat it takes to change matter into expanded gas, the less cooling or pressure it requires to change it back into liquid or solid matter. It takes but a few degrees of heat to expand water into vapor, and, likewise, it requires but a few degrees cooler to contract it back again into liquid so that it can fall back to earth as rain. As long as enough heat remains in it to keep it expanded, it cannot return thru itself, because it is more dense the nearer it approaches the earth.

This same law or condition must and does hold good with all matter. Matter, expanded by the intense heat of the sun (which is 146 times hotter than the Drummond Light) is the gas of a complete admixture of all the elements in nature; and requires the intense cold of the regions beyond Neptune to reduce or condense most of it back into crystals of solid matter. (I say "most," because, as before shown, there is always a remainder when the atoms of gas are divided, or else light and heat could not travel). It may of course be possible that some of the gas expanded at the sun, condenses at a much higher temperature than others; and it would certainly appear to be the case when we remember that beyond Neptune, in the region of the nebulous clouds (which surround the

ecliptic of the solar system) the major part of matter apparently condenses to solid form, yet there are still finer gasses remaining which reach on and on, thru billions of miles of cold, dark space, and which perhaps may never crystallize. Many scientists entertain the belief that when matter condenses in the region where new worlds are formed, the heat or electric energy is pressed out of it and it returns to the sun as currents of electricity or heat; but we must surely all agree that this would be an utter impossibility, because as we have seen, heat and electricity and light are only motions, could not be a part of solid matter, and could never be regenerated except by the friction of falling matter or chemical reunion.

III.

NEPTUNE AND URANUS.

If the sun is forever throwing out heat, energy and substance (as almost all astronomers and scientists admit) it must also have a supply of material coming in, with which to sustain itself. Let us then, carefully examine this procession of returning planets, moons asteroids, comets, meteors, and other matter, commencing at the farthest planet revealed by our largest telescopes, and let each one give its own evidence that it is older than its outside neighbor and younger than its neighbor towards the sun. Let us consider them all carefully, from far away Neptune, that vast, cold, blue collection of crystals, on down to Mercury, the little heavy dead world which, like our old dead moon of the earth, is now held in its last struggle with one of its poles pointed towards the sun, and like the moth circling around the candle, is being drawn surely and swiftly to the sacrifice.

Neptune, 2,800,000,000 miles from the sun, is so far away that even with the large and fine telescopes of modern times, it cannot be very well studied; but we can, however, find a number of facts in regard to it, which help prove the theory of a procession of planets; one of which is that it is a cold, blue mass of loose material. The spectroscope shows the difference between a cold body

which reflects light, and one which radiates light direct from its own fires. Neptune is found to be of the former class; of very low density: Its bluish colored disk has no markings, not even bands; so that we can tell almost

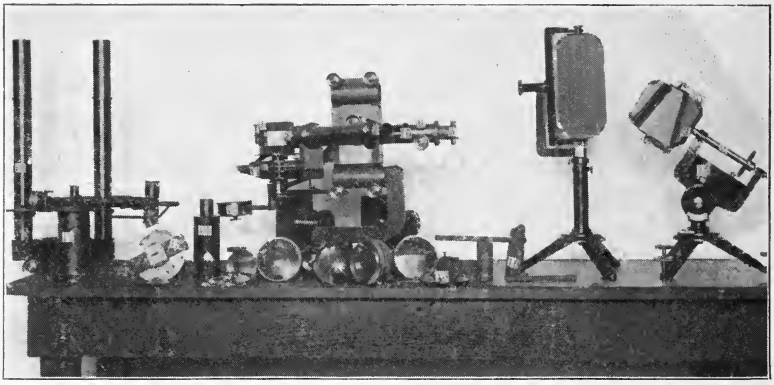


Fig. 8. Spectroscopic Instrument in Lowe Observatory.

nothing about its rotation upon its axis. It moves, in its orbit around the sun, more slowly than any other planet; requiring one hundred and sixty-five years at the rate of about 250,000 miles per day. It is 35,000 miles in diameter, and of so low a density, that it can hardly be considered solid matter. The finding of the planet by Hershell was one of the greatest feats of astronomy ever accomplished by figures and reason at that time. By watching the orbit of Uranus, it was found that some unknown influence was acting upon it. After much hard calculation and figuring, it was finally concluded that a planet

occupied the space outside of Uranus, at the proper ratio. Years afterwards, when the first great telescope was turned upon the exact spot designated, Neptune appeared.

Neptune has but two moons large enough to be seen with modern telescopes; but no doubt there are or will be not less than a score; since we find that planets farthest away have the most moons and rings, gradually losing them, one at a time, as they fall to the planet. These two moons of Neptune are said to have a retrograde motion, contrary to every other motion in the solar system; while the moons of Uranus revolve around it almost at right angles to the plane of its equator, rising in the south and setting in the north.

When we come to Saturn, its moons and rings are almost on the plane of its equator; and at Jupiter, they are exactly so. In another chapter we will consider the reasons for this, and why their orbit is turned over as the planet grows in age, until they conform to the laws of nature as they appear to.

Uranus is visible to the naked eye, but is very faint. It is but 32,000 miles in diameter and requires 84 years to complete its orbit around the sun. The sun gives 900 times as much light to the earth, as it gives to Neptune, and 300 times as much as to Uranus; therefore it would make very little difference whether it was day or night, or winter or summer on either of these planets. The latter planet certainly gives proof, by its bands and warmer color, that the friction (caused by rotation of its

loose fragments) has caused some heat; and it is much warmer than Neptune, which gives not the least sign of warmth. We cannot be sure of the time of the rotation upon its axis, further than that according to the law of Procession of Planets; the cool planets all seem to revolve alike or once in 24 hours. It is only the heated ones that rotate faster as they become more heated. Of course their equators travel faster as they are larger; for instance, Mars rotates in 24 hours, but being smaller than the earth, its equator only moves at the rate of 600 miles per hour. When the first class planets appear to rotate faster than once in 24 hours, it is because of their increasing heat; and the equator always moves faster than the regions toward the poles. The same may be said of the sun, as the spots at the equator travel much faster than the spots at a higher latitude, leaving the latter far behind as the sun rotates on its axis.

A large planet like Jupiter would move at the rate of 12,000 miles per hour at its equator, if it revolved in 24 hours; and the great red spots show that the inside revolves much more slowly than the outside, or than matter at higher latitudes. No doubt when Uranus has reached the present position of Saturn, millions of years in the future, it will have gained the same heat and show a yellowish color, with bright bands almost to its poles.

Sir William Thompson estimates the time since the earth first formed its crust, to be 400,000,000 years; and geologists agree that it is a reasonable time. This, when applied to the discovery of a procession of planets, would take the earth back to the position now occupied by Mars

(who has no drift, or mountains from which to make a drift), and establishes that time as the time between the making of worlds; or, giving us a planet every 400,000,000 years.

Following this estimate, and allowing time for Neptune, we would have eleven such spaces, allotting 4,400,000,000 years for a planet to exist in its spiral returning orbit from Neptune regions back to the sun to be again disintegrated.

The time will no doubt come when, with better telescopes and better cameras, not yet invented, we will be able to detect a new planet forming in the clouds of nebulæ outside of Neptune. This would add 400,000,000 years more to the age of a planet. Of course this time is too long to be comprehended by our present brain capacity; but during the history of many thousand years, we know of scarcely any change in the approach of celestial bodies to the sun; and we must go to the history kept by the rocks, before the time of man, to find a recorded difference of climate on the earth. The glaciers may have existed two hundred million years ago when the earth was much more cooled than Mars is now (or should be, if he were of a regular size) and yet, was so much farther from the sun than now, that our winter poles were much colder than now and winter much longer on account of its greater orbit. Immense growths of vegetation also have been produced during these long summers of continual sunshine, aided by the additional heat of the earth, then just forming a crust.

There are certain facts in connection with the solar system which astronomers, physicists and scientists can and have determined by means of the telescope, spectroscope, camera and other instruments, that cannot be denied. The difficulty seems to have been to put this evidence together properly. If we find by examining the planets from Neptune to the sun, that each one is more heated than the last, until we reach a certain point, half way from Neptune to the sun, (the region of the Asteroids), and then that each one is cooler than the last, till we reach the sun, we may be sure there is a good and sufficient reason for these conditions. If we find that they grow smaller as they grow colder, from this point to the sun, then we have still more proof of a good reason, for these conditions which if true, must not conflict with each other. Neither must any known fact conflict with a theory; because if it does, then the theory is not true.

Now in the case of Neptune, the first evidence of its low temperature is its cold blue color, as shown in the telescope, its immense distance from the sun, its lack of motion, as evinced by its lack of bands. Other first class planets have more and more bands as they become heated. It is also perfectly round and shows no flattening at the poles, as it would if it had a fast axial motion, and was heated. The spectroscope shows it to be composed of loose or individual pebbles, dust and sand, and of very low density.

Uranus shows more heat than Neptune by its greenish colored disk and by its faster motion. Its pebbles and

dust are more condensed, not yet being warm enough for expansion. It travels nearly one hundred thousand miles per day faster on its orbit than Neptune, and rotates on its axis fast enough to show at least one band at its equator and also a slight flattening at the poles. This difference of shape and color shows definitely an increase of temperature over Neptune. Also like Neptune it is shown to be composed of loose pebbles, etc.

Saturn shows still more heat by its yellowish bands and rapid motion. It is also much more bulky and gaseous; a condition which further indicates an increase of heat.

Jupiter shows still more heat by its bright red bands and spots, its immense gaseous bulk and rapid rotation. By its great heat it shows that it must comparatively soon become a molten mass. When it does become hot enough to ignite and burn, it will no doubt make such an immense light that it can be seen for a short time, perhaps as far as our nearest sun; and will then be one of those mysterious new stars like the new star in the constellation of Perseus in 1901.

At this point of the return journey (the region of the Asteroids), the next planet seems for some reason to have gone to pieces while in its molten condition, since instead of a large planet we find hundreds of small ones traveling in a great orbit where the large planet should be. From this point on to the sun, each planet becomes cooler and cooler, and its mountains higher as it grows older.

In the gathering of a new world, we must consider the crystals as having the same motion the atoms of gas had when they left the sun, which was four thousand miles per hour from west to east. When we consider these motions, we see that an atom one mile nearer the sun than an atom a mile farther away would have an orbit two miles less in diameter or six miles less in circumference; and at the completion of an orbit the atom nearer the sun would have gained six miles on the one farther away. We see then, that all matter between us and the sun is passing us (because it is in shorter orbits) and that we are gaining on and passing all that is outside of us. If then, we are on the largest bunch in the zone, we must attract and add all that is passing near us, and also all that we are catching up with. The more we attract and add to our bulk and weight, the more we have and the farther we reach out for more on both sides with our unseen fingers of gravity. Finally we must pick up all the atoms of matter on both sides of us for millions of miles. There would be no possibility for little worlds to get away from our big one, because they must either pass us or we must pass them within attracting distance, thousands of times no doubt; so that, sooner or later they must be attracted to us. We are continually approaching nearer the sun, however, gaining speed and getting out of the nebular zone where this world formation goes on. If it were possible for one group of small worlds to form this way, then it would not be possible for one large one to form which would take them all. The fact that there

is but one belt of Asteroids in the solar system and that they occupy the proper position for a planet is bona-fide evidence that they are the remains of a great planet which bursted before it radiated to a second class size. If they had formed in a region beyond Neptune, independently of each other, it is not likely that such small bodies (some of them not more than ten miles in diameter) could create the heat by friction necessary to melt them. When the planet exploded, the parts thrown toward the sun greatly increased their speed, while those thrown the other way, or up, lost speed and also were thrown into longer orbits. There was no center of gravity left for the planet as it was distributed by the explosion, and therefore the ones nearest the sun soon left the others far behind. Then it would be but a few thousand years until they would be scattered in a zone around the entire orbit of the planet. No doubt many have attracted each other and come together while the planets and satellites of Jupiter, Mars and the Earth have attracted others. The planets are so much larger that their great attraction acts against any attempt to form another center.

IV.

SATURN.

When we come again halfway to the sun from Uranus, we find Saturn, one of the most remarkable planets on account of its curious rings. These, however, need not be taken too seriously, as they may be only worn out comets or belts of meteors wrapped around it in short orbits; or more likely former moons that have disintegrated and are thus falling to the planet as meteors. Saturn is 870,000,000 miles from the sun and makes an orbit in twenty-nine years at the rate of 490,000 miles per day. We must not forget to notice as we go along that each planet as we come in, is traveling about twice as fast as the last one outside of it. We must notice also that they have dropped towards the sun about one-fourth of the diameter of the orbit each time, or halfway to the sun. Here in the case of Saturn we have the details of world making near enough to be better understood, in that degree of development where great heat is generated, by the friction of grinding matter. We must be careful not to confound this mechanical method of heating with the chemical heat produced in the sun by chemical disintegration of matter. Being 76,000 miles in diameter, it will be seen that in making one rotation on its axis in twenty-four hours, the surface would revolve at the

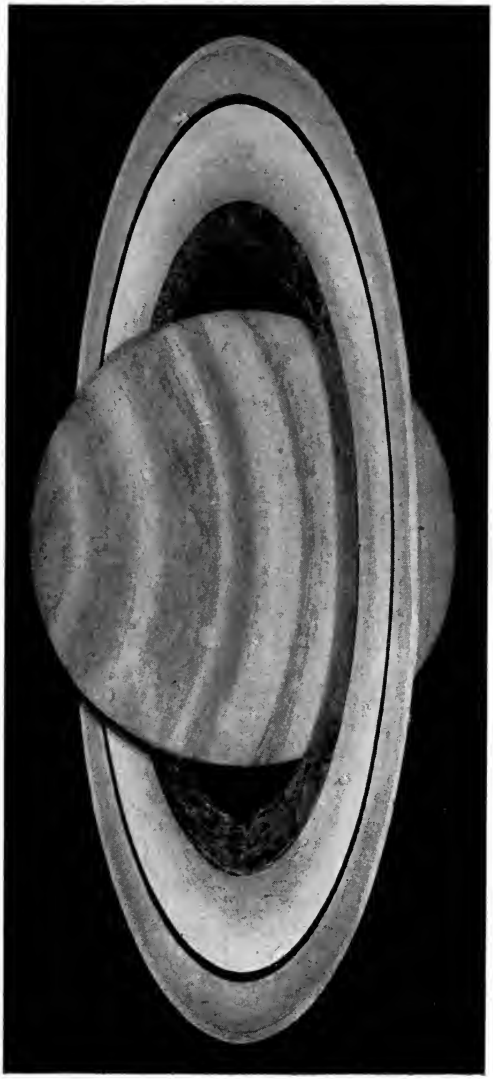


Fig. 9.—Saturn and its curious ring, which are undoubtedly remains of a moon which has gone to pieces and is falling to the Planet.

equator at the rate of 9,600 miles per hour. The surface however, travels much faster and is credited with making a rotation in ten hours and fifty-five minutes. To illustrate why the first class planets, Neptune, Uranus, Saturn and Jupiter rotate faster and faster as they come in towards the sun and become hotter and hotter at the same time, let us consider them as great electric machines (electricity is but a slower vibration of heat), exalting their own motion as they rotate their outside shells or secondary helix, and turn to a description of the Siemens and Wheatstone machine, which is officially described as follows:

Expressed generally this discovery consists in exalting by means of its own action to a high degree of intensity an infinitesimal amount of magnetism. Conceive an electrical magnetic core, with a very small amount of residue magnetism, which is never wholly absent when iron has once been magnetized. Let a secondary coil with cores of soft iron rotate before the poles of such a magnet. Exceedingly feeble induced currents will circulate in the secondary coil. Let these induced currents, instead of being carried away, be sent around the electrical magnet which produced them and its magnetism will thereby be exalted. It is then in condition to produce stronger currents. These being also sent around the magnet, its power rises still higher; a more copiously produced current is the result. Thus by a series of interactions between the electrical magnet and the secondary helix, each in turn exalting the other, the electrical magnet is raised from a state of almost perfect neutrality to one of intense magnetization.

This shows how these big planets increase their rotary speed from Neptune to Jupiter as we have seen they do, and thus become more and more heated as they grind their loose mass of matter, causing the friction which finally melts them.

The outside of Saturn's rings travels at the rate of

30,000 miles per hour; and Clerk Maxwell, an English scientist, has shown by the spectroscope that they are composed of myriads of small matter and pebbles, too small to be seen individually, even by our largest telescopes. Dr. Keller afterwards proved this by using photographs of spectroscopic observations. He showed that the outer edges of the rings travel faster than the inside edges; thus giving a grinding motion which also proves they are not solid. This motion would cause heat when applied to a planet of loose material, which the first class planets are.

A majority of astronomers now agree that Saturn is in a more or less heated condition, and that the placid clouds in which the planet is enveloped, hide the heat within. However, the ball does not show nearly so much commotion as that of Jupiter, which has been grinding 400,000,000 years longer.

Saturn has nine moons which are traveling around it from west to east, almost on the plane of its equator, while at Jupiter, 400,000,000 years later, they are exactly in place; and traveling on the plane of the sun's equator, or on the ecliptic of the solar system. The rings of Saturn are very thin, and estimated to be not more than one hundred miles thick and cannot be seen with a small telescope when turned edgewise to us. Gallileo, who discovered them, supposed they had fallen to the planet when they afterwards turned edgewise. They did not turn back during his lifetime and he died in that belief. The inside ring appears to be nearing the planet, as meas-

urements taken by Gallileo show, when compared with the present time. Changes would naturally take place quickly, as there must be continual friction and collision so that they would fall faster than as if their falling speed was not interfered with. As moons obey the same law in falling to their planets, which planets obey in falling to the sun, it is possible that these rings may be the remnants of a disintegrated moon as described hereinafter by William Plotts. The next favorable time to observe the rings at their greatest inclination will be in 1914, when they will be inclined twenty-eight degrees from our line of vision.

Belts are seen around the ball of Saturn almost to its poles. It is only one-eighth as dense as the earth, which is another proof of its heated but unmelted condition. When it becomes hot enough to melt by friction it will then be as dense as the earth, the friction and heating will cease, radiation and cooling will commence, but it still has 400,000,000 years to grind and heat, before it reaches the position and heat that Jupiter shows now.

Saturn was the most remote planet known to the ancients. On account of its great distance from us, it shines with a feeble tho steady light, which distinguishes it from the suns in space. It is smaller than Jupiter because it has not heated so much by the friction of its rotating and grinding matter. It has nine satellites or moons, the farthest being 2,225,000 miles from the planet. It revolves around the sun at a distance of 872,000,000 miles and requires about twenty-nine years to complete its

orbit. The light and heat of the sun at its orbit, is only one-hundredth part as great as at the earth; therefore it makes little difference whether it is day or night, or winter or summer. The axis is inclined thirty degrees from perpendicular; and the seasons are therefore about the same in proportion as those of the earth.

William Plotts, the famous oil expert and discoverer of oil fields at Whittier, California, a thinker of extraordinary capacity (as may be seen by his successful reasoning in discovering oil fields worth millions of dollars for himself and companies), says in Higher Science for March, 1904:

* * * Now I do not take much stock in violent crashing of worlds together in space. The deposition of a planet on its superior is, no doubt, as deliberate as the other evolutions of these bodies and would be so slow that a man could not note any change in his lifetime; and many forms of life would have time to evolve by natural selection, into adaptation of changed conditions, if, for instance, our moon should be in process of deposition upon the earth, and speaking cosmically, that event is about due. We are familiar with the trick of swinging a bucket of water vertically around our heads to show that the water would remain in the bucket upside down. Now if instead of a bucket of water we substitute a bicycle wheel containing a little water, we find when rapidly revolved, the water distributes itself evenly through the tube, with a tendency to flatten out in line with the hub and if all the gravity of the earth was absent and a globe of metal weighing say one hundred pounds, would take the place of the wheel, it is obvious that the water would take on the form of a thin hollow disk, provided the revolution of the water was just right to balance it. Now we must assume that an advance planet like Mercury or the moon has no cohesive qualities except local gravitation, because the outer crust of the earth where it has cooled has none, being checkered by cleavage caused by the surface cooling faster than the interior, also the faulting and crushing that comes from lateral pressure of the whole crust commonly ascribed to the shrinking of the earth. As an inferior body

approaches its superior it gradually loses its local gravity and takes on a tendency to form a thin disk as the water would. The body would probably first separate into two or more parts and if they became far apart in line with the superior globe before extensive disintegration of the parts, they would form two or more disks, one within the other, all revolving as before the separation of the disks into rings. This process would go on until the inner edge of the disk or disks began to be retarded by the superior globe's volatile envelope corresponding to our atmosphere, when the disintegrated matter would descend in the form of meteors, tho not so rapidly as to destroy life to any considerable extent. The most serious feature however, to a life-containing globe like the earth, would be the interference of the rings with the rays of the sun and perhaps the perplexing conditions ascribed to the "glacial epoch" could be accounted for in this way. * * *

Same writer in Higher Science magazine for February, 1905, says:

* * * My interpretation of the Heald law of the planetary procession is, that all bodies are falling together as fast as they possibly can; or rather, that all minor bodies are falling toward the sun as fast as they can and will eventually join it; and in compensation a like quantity of matter in an invisible and immensely expanded state swells constantly upwards, condenses and concentrates into new planets, mostly beyond the orbit of known planets. This being the case, and there seems to be no possibility of refuting it, there will be a time when each minor body will be absorbed by its superior. My conception of this process is, that it is as orderly and deliberate as its whole approach to its goal; and that one phase of this process is in full view in the planet Saturn and its rings. * * * * *

V.

JUPITER.

Leaving Saturn to its grinding and heating, and coming in once more halfway to the sun from Saturn, we arrive at the greatest of all the planets in size. It is swelled almost beyond recognition as a planet and is surrounded by all the gases and clouds belonging to a stage of great heat; a stage thru which every planet must pass before it can melt into a smaller body and commence its task of radiating to the size of a second class planet, and cooling so that it can form a crust and produce life. This it could never do without the melting and condensing which stops the friction of grinding. Neither could gravity separate its elements, which if not separated, could not create the chemical heat in reuniting with the matter of the sun, as they do when separated into their elements. Points on Jupiter's surface travel at great speed; and it is supposed to make a rotation in a little more than nine hours. Of this, however, we cannot be quite certain, as we have only seen the motion of its outside shell as is also the case with all first class planets and the sun.

Says Prof. James E. Keeler:

In 1878 there suddenly appeared a pink spot on the surface of Jupiter of unprecedented dimensions; the length is given as 30,000 miles by 7,000 miles broad. In another year it was a full Indian red. So

completely did it dwarf all other recorded spots that it was henceforth known as "the great red spot." It faded away and was almost invisible in 1883. The time of rotation of the red spot is not the same as the adjacent forms. In 1890 a large spot was moving towards the red spot at the rate of 20 miles per hour. The great red spot was like a bank of sand in a river past which the clouds go scurrying.

This shows conclusively that the inside of Jupiter does move more slowly than the outside; and many astronomers consider the action of the spots a proof of it. The bright colored bands of Jupiter show it to be a

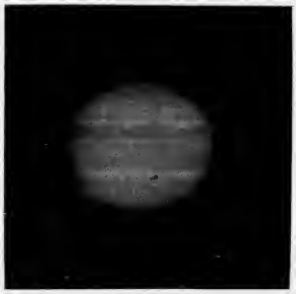


Fig. 10.—The Planet Jupiter from photograph by Barnard.

glowing mass almost ready to melt down. When it finally does so, and settles down to a much smaller size, the process of radiation will commence at once, and Jupiter will be a bright burning star like the planet that made the Asteroids by its bursting.

It has been a standing mystery why Neptune, Uranus, Saturn and Jupiter are such monsters in size when compared with Mars, Earth, Venus and Mercury; but it seems very simple that they must melt and radiate to a reasonable size, before they become cool enough to form a

crust. Jupiter will be almost a small sun when he finally bursts into flames; but he will not reach the present orbit of Mars for 800,000,000 years where he can cool, form a crust and commence to evolve life. He is the great giant among planets now, but each one as it reaches his present orbit will be the great giant. Saturn is following; and when he has become melted and is radiating his bulk away, Saturn will be the great giant, its rings and some of its moons will be added to the melting mass, Uranus will be in Saturn's place, Neptune will be in the place of Uranus and a monstrous blue, cold cloud of sand, stones and crystals will come in sight as a new world just showing its motions and its comet moons probably revolving backwards in their orbits.

Jupiter is the nearest of the large planets and is 483,000,000 miles from the sun. On account of its great distance from the sun when compared to the earth, it presents no visible change of phase; always appearing full, almost the same as if we were at the sun. This also applies to all the planets more remote. The volume of Jupiter is about one and a half times all the others in mass. Its rapidity of rotation produces a sensible oblateness, its ellipticity is so considerable a deviation from the spherical form that it is perceptible to the eye without measurement. The orbit of Jupiter is nearly in the plane of the ecliptic and has an eccentricity of one-twentieth, which is three times that of the earth's orbit. The equator is inclined three degrees to the plane of its orbit;

so there is no perceptible change of seasons, even if there were sunlight enough to make seasons.

Belts of Jupiter are the bands or stripes of darker shade than the rest of the disk stretching across it in the direction of its rotation. They vary from time to time in number and width, sometimes covering a large part of the surface. The belt usually appears of uniform width entirely across the disk, but not always. Occasionally its edge is broken and often much wider in one part than another. The change of breadth is quite abrupt, thereby revealing the rotation of the planet.

Jupiter has seven satellites; the farthest one from the planet being 4,228,000 miles distant; four of them are large enough to be seen with a good field glass and one of them large enough to be seen with the naked eye, from mountain heights of Southern California. On account of the great size of Jupiter and its shadow, and the small inclination between its own orbit and the orbits of its satellites, most of the moons of Jupiter are eclipsed at every revolution when on the opposite side of the sun, while they usually eclipse Jupiter itself, in passing between it and the sun. These eclipses are occurring almost daily. When Jupiter is eclipsed by one of its moons, we see only a dark spot going across its disk. The velocity of light was first discovered by observing these eclipses. Roemer noticed that as the planet and the earth were receding, the time of the small moon, I, did not come as soon as it should; and in wondering why it was so, he concluded it took light that much more time to

travel the extra distance. So he watched the eclipses until the two planets began to approach each other again, when sure enough, the time began to shorten and the eclipses came too soon. From this he soon calculated the speed of light.

Astronomers accredit Jupiter with a red atmosphere. No doubt it has a fiery gas under the carbonaceous clouds that partially hide its great smothered heat; and people will think the inferno has broken out again, if any are alive when the smothered flames of Jupiter can no longer be hidden under the blankets of carbon and it bursts out into a blazing mass of fire. The great red spot may have been a moon which had been revolving around Jupiter, under its clouds of carbon, and which was too small to be seen till it fell into the more solid interior of the planet and received enough heat from it to make a red color. Some astronomers explain the so-called red atmosphere to be due to sunlight effects on its clouds. They forget that the planet is five times as far from the sun as the earth, and that sunlight there would be a very small matter indeed.

Summing up all the evidence in sight, we find Jupiter hotter and more expanded than any other planet in the system. Saturn following him, is heating, Mars before him is cooling; so that, at some point between Jupiter's orbit and the orbit of Mars, is the point of greatest heat as we have seen, where the worlds melt as they come in. Also as we have seen, and as the spectroscope and telescope plainly show, up to this time they have been grow-

ing warmer. While they were heating, they were also swelling in volume, as well as having considerable stray matter added to their bulk as they generated heat, electric and magnetic currents and power. They have rotated faster, and at the same time they have traveled faster on their orbits as they have dropped towards the sun, till now we find Jupiter traveling at the rate of 690,000 miles per day. Saturn makes a revolution on its axis in ten hours and fourteen minutes, while Jupiter, altho many thousand miles larger in circumference makes a revolution in nine hours and fifty-five minutes. We do not know the time in which Uranus rotates, but we know it is much less than that required by Neptune. This is proved by the faint band around Uranus. So, we see that, more and more they become great electric heat-dynamoes, as they come in, till they reach the present orbit of Jupiter which must be near the melting point. The sum of the evidence is patent to all: as the planets grind away thru the million ages, they generate by friction, the heat and electricity which finally melts them down. Then, their increasing electrical and heat motions being no longer augmented, cease; and the mass gradually settles back to the rotary motion of the inside matter of the planet, which, as we have already seen, is the inherent motion of all matter as, in the form of expanded gas, it comes from the sun's equator.

VI.

THE ASTEROIDS.

Coming in this time halfway from Jupiter to the sun, which point, as we have seen, should be the orbit of a planet, we find signs of the celestial catastrophe before referred to, the scattered remains of a planet; fragments of a world, burst in the crucible. Here seems absolute proof of its former great heat and rotary motion; because, it would have to be thoroughly melted and condensed before it could explode, and if it had not been in a molten state when it exploded, the pieces thus far revealed to us by telescope, would not be as they are with a few exceptions, in spherical form and smooth, but in all kinds of shapes and chunks. The reason for the exceptions will be seen as we consider the moons of Asteroid before its explosion and subdivision.

The contracting theory that these bodies came from a ring of matter left over will not stand the test, because conditions prove them to have been in a molten state when formed, and we can easily see that such small bodies as they are could not of themselves generate sufficient heat to cause the melting. That they would cool very fast is obvious, from the fact of their small size, and judging by their weight, density and size, they must be cooled to the center. They follow the original orbit of

the planet, as nearly as could be expected, but of course are greatly scattered and strung along the orbit.

It would be of the greatest interest if we could see this fiery planet in its orbit, unimpaired, as future inhabitants of the earth will sometime see Jupiter, provided of course, he too does not burst in passing this danger point. No doubt the planet Asteroid (?) would be much smaller than Jupiter, because it would be in the molten state and much of its heat and weight radiated away; yet it would no doubt be much larger than the earth, as it would still have 400,000,000 years to radiate and condense, before reaching the present orbit of Mars, where a crust could begin to form. If the original planet still remained intact, it would no doubt be a bright burning star in the most interesting stage of its radiation to a planet of the second class.

The objection that if one planet bursts at the orbit of the asteroids, they should all do the same, is not a necessary conclusion. Its bursting was due in part to its overrate of speed in rotating, induced by the mechanically produced overproduction of electrical magnetic energy; and while nature herself makes no mistakes, we know that a machine is always liable to accident. The planets, we see, become at this point great electro-magnetic machines, liable to accident; but we also see that Mars, Earth, Venus and Mercury have all reached and passed this danger point safely.

There is no legend or story in history of this fiery orb, therefore the accident must have occurred more than

thirty-five thousand years ago. Perhaps if archaeologists continue to find old cities beneath the almost mythical city of Nipur, they may yet find some reference to it, inasmuch as it must have been a very prominent feature of the sky, having almost the appearance of a small sun for at least two years out of seven, and would have been the third celestial attraction while it lasted.

In order to throw all the light possible on this interesting procession of planets, we must consider for a moment, what might have become of the four moons due to this unfortunate body at the time of its bursting. We must also see that as moons are always smaller, therefore cooler than a planet, the nearest moon of Asteroid might be broken in the explosion. Eros, the nearest asteroid to the earth of any known, is only a fragment of a larger body. It has corners where its different faces meet at angles, and shows regularly alternating brightness as it rotates every five hours and twenty minutes. There are also a number of other fragments, as there should be, if a moon was destroyed in the accident. Its nearest moon, of which Eros was undoubtedly a part, was probably between it and the sun at the time of the accident and was broken to pieces and thrown towards the sun. All the asteroids that are not spheres have the apex of their orbits this side of the center of the belt of Asteroids. It has been discovered within the last two years that one of the asteroids is almost the size of our own moon and that there are several larger than the greater moon of Mars. No doubt these asteroids are really the

moons that once followed that unfortunate body. We may be quite sure that at least three moons are in some part of the orbital path of the asteroids between Mars and Jupiter; and these larger bodies may be the moons wanted as witnesses. Perhaps there may be billions of these asteroids that can never be seen from the earth as they are 100,000,000 miles from it on an average at the nearest point, and five times as far, a part of the time. Eros, the nearest known asteroid to the earth, will come as close as 19,000,000 miles in 1924. Its orbit is an elipse and at times is far inside of Mars. Being so small (only 20 miles in diameter), it is easily influenced out of its orbit by the planets and is liable to be picked up sometime by Mars, as it must cross the orbit of Mars in every trip round the sun. Eros is expected to furnish an exact basis of measurement by which to correct distances of all celestial bodies, because it is so small that its exact position within a few feet can be taken at any time.

The asteroids, like Neptune, were discovered by means of mathematical calculations, coupled with theory and reason. In 1772 Titus found that the following ratio would represent the approximate positions of the planets from the sun. Representing the earth's distance by ten, he found the following ratio by theory and fact:

Planet	Ratio	Theory.	Fact.
Mercury	0+4	4	5.9
Venus	3+4	7	7.2
Earth	6+4	10	10.0
Mars	12+4	16	15.2
Asteroids	24+4	28	28.5
Jupiter	48+4	52	52.0
Saturn	96+4	100	95.4

Neither Uranus nor Neptune had been discovered at that time, but when Uranus was discovered and found to reasonably conform to the same ratio, this gap between Jupiter and Mars made such an impression on Bodie, the great Berlin astronomer, that he undertook the task of finding the missing planet.

It was, however, twenty years before Piazzi, a Sicilician astronomer, discovered the first asteroid, Ceres. Since that time they have been discovered almost nightly, by cameras which were set for them. Vesta, one of the asteroids is visible to the naked eye and altho it is not the largest it is the brightest. The diameters of the four largest of these tiny worlds discovered prior to 1845 are as follows:

Ceres 480 miles in diameter.
Pallas 304 miles in diameter.
Vesta 243 miles in diameter.
Juno 118 miles in diameter.

They cannot be distinguished by the telescope from faint fixed stars, except by their motion. They are generally too small to show a sensible disk and cannot be

measured with any certainty. It is estimated by the slight disturbing influence that they exert that their entire mass is equal to only a fraction of the earth. This however is because each one acts independently for itself; and their entire mass might easily be larger than the earth. The eccentricity of most of them is greater than that of any of the eight planets. The obliquity of the planet Hebe, is fourteen degrees and that of Pallas is thirty-four degrees, the greatest yet discovered. The orbits vary considerably in size and therefore the periodic times are various; but as they are generally quite eccentric, every one is nearer the sun at perihelion, than any other one is at aphelion. The orbits are therefore all linked together and pass thru each other. Thus they are regarded as moving amongst each other around the sun within the limits of a ring, the breadth of which in its radius vector is more than one hundred million miles. Flora, which moves in the smallest orbit yet discovered, performs its revolutions in three and one-fourth years; while Cybele, the most remote, requires six and one-half years.

VII.

MARS.

Once more halfway to the sun from the Asteroids we find Mars the red planet of war. Having safely passed the bursting point in the procession of planets, it is now in the act of cooling and forming its crust. It is receiving its atmosphere and water, which its own heat has more than likely been holding at a distance for hundreds of millions of years, since it began to melt in the vicinity of Jupiter and it is now almost ready to produce and support life, which the laws of evolution will surely bring. It has already received its motions in the great mass of blue crystals which formed it so many million years ago up on the border of our planetary system. We can already see snow at the poles of Mars, at such times as they are turned from the sun. The winters are twice as long as our own; but the fact that there are only small caps of snow at the poles, where the sun does not shine for a year at a time, must convince us that it is very hot within itself. If there was no more heat in the planet than the earth, it should be at least half covered with snow continually; because it is twice as far from the sun as we are, and its winters are twice as long. Its color also seems to indicate great heat.

When a planet melts of course the friction of grind-

ing material ceases and the generation of electric energy or heat stops; then it must at once commence to cool by the slow process of radiation. After millions of years of radiation and reduction in size, it would become cool enough to form a crust or temporary crusts, like thin ice

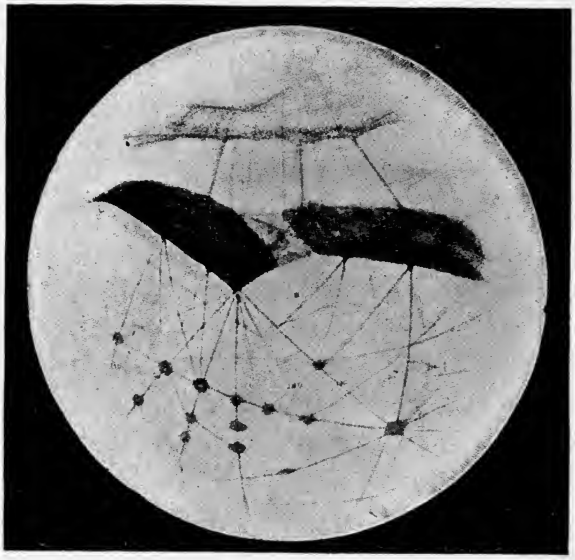


Fig. 11.—The Planet Mars, from a drawing by Lowell.

over a pond which might become checked or cracked, time after time, perhaps. The contracting of the cooling crust in the early stages of crust formation might cause great crevices , and these crevices give rise to the many speculations indulged in by astronomers, concerning the checked appearance of Mars. Some astronomers contend

that Mars must be inhabited because these curious lines look somewhat like irrigation ditches. Sir Robert Ball, the English astronomer, says they are undoubtedly artificial because nature never makes straight lines. This is a mistake, because nature always makes straight lines when cooling or crystallizing. Prof. Baumgardt of Los Angeles, in his lectures on astronomy shows a glass globe which while very hot, was suddenly cooled. This globe gives very much the appearance of Mars, being checkered and cracked in straight lines. The earth seems to have great crevices extending sometimes for hundreds of miles. There is an apparent crevice running thru San Diego county, fifteen miles from northwest to southeast, from which minerals have been deposited in the strata above. This belt at the surface is about one-half mile wide; and whenever a ledge crosses it, it is mineral bearing. The shoots of ore on the southwest side pitch to the northeast and vice versa, showing that this crevice must be at least two thousand feet below. Almost any old prospector can mention hundreds of these mineral belts. Nature seems to make curved lines only by heating and straight lines by cooling.

The most reasonable explanation of the so-called Martian canals is that they were made by the great rush of water from the polar regions. It is still more reasonable when we remember that the surface of Mars is flat and smooth, not having cooled enough to have raised any mountains. It is receiving its water as snow at its poles; and when this melts, of course, it flows towards the equator washing deep channels until it is evaporated

again in the hot regions near the equator into steam, to again fall at the poles as snow. Thus we can perceive how these canals may be made by this endless round of water, flowing but one way in a land which is as yet almost a level plane, with probably little or no crust formed at the equatorial regions. No doubt the planet is much cooler than the earth was at the same position in space, because being so much smaller, it must have cooled much faster than the earth. Having cooled so much faster on account of its small size, Mars may be in a condition to support life at an earlier period or position than the earth was, provided the greater distance from the sun and the smaller amount of light does not interfere.

If it is possible that, on account of its pygmy size, Mars is in advance of the earth with regard to cooling, when at the same orbital age, the life forms it could support must still be of a very primitive kind. There are innumerable theories regarding Mars and the probability of its being inhabited, but these guesses are based on the belief that it is millions of years older than the earth; a popular fallacy without reasonable foundation. The density of a planet, as of all other natural formations, must tell its age. It is the work of gravity that produces the effects of age and it is as easy to observe the age of a planet, as of a man, by simply looking at it. Mountains are the wrinkles showing the age of a planet, a man or any other object of natural formation.

Mars appears to be a pygmy amongst the planets and his moons are pygmy moons, for which there is some

good reason that mathematicians should be able to show. There may have been less material within reach, when Mars was being collected by the force of gravity, or, the planet comprising the Asteroids may have, by gravity, stolen part of the matter that belonged in his belt. One thing is quite evident; he was never as large as an ordinary planet, because his moons are pygmies, proportioned in size to himself. Being so small at the start, himself, he could only attract from a narrow belt according to the law of gravity described by the old maxim, "Unto him that hath shall be given and to him that hath not, shall be taken away even that which he hath." If, away out in the regions of world-gathering, little Mars should be smaller than Asteroid, outside of him, and the earth, this side of him, we can readily see that they would attract farther and stronger and so rob him on both sides, of material that belonged in his legitimate zone. The first life generated on a cooling planet would be governed by conditions and would be plant life. From this it must slowly evolve and for millions of years the poisons of its low swamps and rotting vegetation would not permit any higher types of life than serpents. On our own earth the records in the rocks show that even birds were serpentine during all the first stages of animal life, when there were no mountains and when vegetation, aided in its growth by the inner heat of the earth, was of such enormous size and quantity.

Almost all astronomers, basing their views on the Nebular Theory, believe the planet Mars to be older than

the earth. If however, the Processional Theory is correct, as all the facts and figures prove, it exactly reverses the order of the age of planets, making Mars the next younger than Earth. The Processional Theory seems to afford the only means for accounting for many hitherto unexplained conditions such as, the speed of light, sun spots and explosions, temperatures of the planets, shortening of orbits, the rings of Saturn, positions of the planets in the solar system, the plane of the ecliptic, the formation of the new star in the constellation of Perseus, Professor Lebedu's "outward pressure of light," the ceaseless motion of matter, mental and wireless telegraphy, the reason Venus has no moons, how celestial bodies gain speed, how new worlds are formed, the existence of "ring mountains" on the Moon and hundreds of other facts in nature, the solar system and stellar universe, which no other theory or hypothesis can explain and prove by figures. No other theory can explain why a new planet just forming in space, must take the motion of an orbit around the sun from west to east.

Getting back over the ground somewhat, let us look a little closer for more evidence that Mars is younger than the earth: We are quite sure that the earth has at one time been a ball of fire and thereafter became sufficiently cooled to produce life. Now if the earth were younger than Mars, it would of course be older than Venus; and so Venus must then be hotter than the earth and Mars cooler. We actually find, however, that Venus is cooler than the earth (which certainly proves it to be older) and

that Mars is hotter than the earth, which also proves it to be younger. As a molten planet cools it must form a crust; and as the crust thickens, the planet contracts and mountains necessarily rise upon the surface. They could not do so on a planet that had no crust, nor on a planet with a very thin crust. What, then, is evident when we compare these three planets in respect to mountains? First, we find Mars, 141,000,000 miles from the sun, with absolutely no mountains; almost a level plane with the exception of what are called its inland seas. It has not and can have no large inland seas until its crust is thick enough to contract and form mountains and its water can fall to the surface and gather into large bodies. Next we find the earth (93,000,000 miles from the sun) with mountains as high as 30,000 feet and a crust not yet thick enough to confine all its inside molten matter. Its oceans are connected around its entire sphere. Next we find Venus (65,000,000 miles from the sun) with mountains estimated by fairly correct measurements of their shadows, to be 142,000 feet in height. How could these three conditions exist if Venus was younger than the earth, and the earth younger than Mars? They could not. If the earth were gradually becoming hotter, then this would be the case; but everything goes to prove, and all science agrees that from a molten state, millions of years ago, it has cooled to its present degree of density.

Mars also shows by melting of its snow so quickly after its long winter, that it is much hotter than the earth. It has but one-fifth as much sunlight as we have on the

earth and its winters are twice as long as ours; yet for all this, we find but small caps of snow at its winter poles, as, alternately, each is turned from the sun for a whole year. This condition could not be, if its crust were not thin and its molten matter near the surface. No doubt if Mars were a full sized planet, it would still be almost, if not entirely devoid of crust; but being so small, it has actually cooled faster than it would have done, if of the usual size. In the cooling of the Asteroids we see the same principles illustrated and worked out. (The number of moons of this and other planets, is another important factor bearing on this matter of proof, which will be considered in another chapter.)

The very color of Mars, indicates recent heat. It is of an ocher or burned brick color. The "red planet of war" being so much younger than the earth as to have not yet raised a mountain range, could not very well produce other than a low order of vegetable life forms from which all higher life must evolve during the hundreds of millions of years required to reduce its orbit to the size of Earth's orbit, at which time its internal heat will have become so radiated that it may have a thick crust, mountain ranges, open seas, plenty of sunlight, seasons the length of our own and other conditions necessary to sustain human and other life as we have upon the earth now.

Light signals coming from the earth could never be seen at Mars even if it were possible for the planet to support human beings capable of speaking the English language and using as good astronomical instruments as

we use on earth. This has been shown by Prof. Larkin of Mt. Lowe.

In the cut we represent Mars in four positions in his orbit around the sun and showing his nearest approach to the earth (47,000,000 miles) which happens when both planets are on the same side of the sun. At this time the

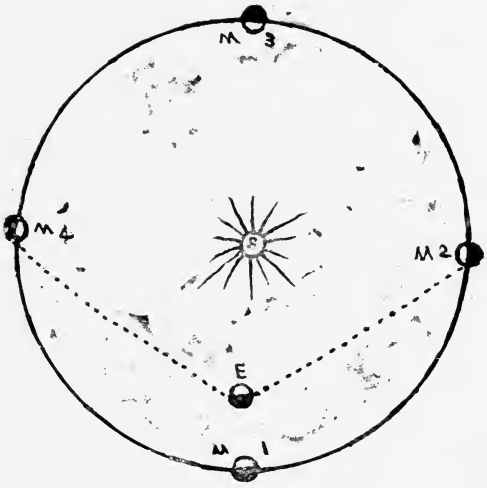


Fig. 12.

dark side of the earth is presented to Mars when it is midday at Mars. This gives but little chance that any possible inhabitants of Mars could receive signals from the earth. Conditions at other times are almost the same except that the two planets are farther from each other; the greatest distance being 237,000,000 miles when on opposite sides of the sun. Mars does, however, exhibit

small phases at 2 and 4, supposing the earth should remain at the position in the cut. Such conditions occur but a short time twice a year; so, we can but rarely get a glimpse of a small portion of the dark side.

As Mars revolves in an orbit outside of the earth's orbit, it can come into opposition to the sun, as well as into conjunction with it; appearing at every degree from 0 to 180.

Mars is blessed with two moons; Demis the largest is 12,900 miles from the planet's surface, while Phobus, the innermost, is but 3,000 miles distant; and makes a revolution around the planet in seven and one-half hours, or three times while Mars is turning once on its axis. For that reason Phobus has the distinction of rising in the west and setting in the east. Both these moons are dead moons, having turned their magnetic poles to the planet. There is every reason to believe that within a few centuries, this little satellite, Phobus, will have ended his long journey by plunging thru the thin crust, into the molten matter of Mars; or, by attaining such a swift speed that centrifugal force, opposing the force of gravity, will take away his own center of gravity and allow him to disintegrate into a belt or ring of meteors which will gradually fall to his surface or be burned in his atmosphere. A perceptible shortening of his orbit should be measured in a few decades.

The discovery of the moons of Mars was predicted by Voltaire, Kepler and Swift, who calculate the ratio of moons from Saturn to Venus. The number of moons fol-

lowing a planet, makes, of itself, a most interesting study, well calculated to set an inquiring mind at work in earnest, when considered in connection with the Processional Theory. The further and still more astonishing fact, that they always obey the same law of ratio, both as to approach and speed, that the planets show, in approaching the sun, gives another volume of evidence to still more overwhelmingly prove the law of a procession of planets to be correct.

VIII.

THE EARTH.

1

The next planet, also in its proper place, halfway between Mars and the sun, is our own Mother Earth, perhaps in the very prime of her motherhood. Prof. Isaac N. Vail, in his excellent work, The Story of the Rocks, gives both Saturn and Jupiter younger dates than the earth. He does not attempt to show why, or give reasons for the position in space, but goes on to show and give proofs that, long eons ago, the earth has passed the stages thru which they are passing now.

Altho the earth is only half as far from the sun as Mars, and the winters only half as long, it has many times more snow at its winter poles. The snow sometimes reaches its tropical lines, covering the temperate and frigid zones, while Mars has only a small cap of snow around its Artic and Antartic circles during winters twice as long as ours. This proves beyond the posibility of a doubt that Mars has much more internal heat than the earth.

That the earth has been much hotter than it is now, is plainly shown by the historical records which nature and time have faithfully written upon the rocks of its

crust, without sentiment, fear or favor. (Reference may be had to any good geology or encyclopedia, as there is no disagreement among scientists upon this point.) It is evident by the construction of the fire rocks, that at the time they were first hardened, there was no water on the face of the earth. No doubt it was held suspended or pushed up to a certain distance in the form of vapor, by the force of heat and that it fell only after the force of heat had sufficiently subsided to make it possible for the force of gravity to condense it and bring it down, first at the winter poles where the force of heat was the weakest. Professor Vail's Annual Theory of the falling of snows and vapors first at the poles would not be in opposition, therefore, to nature and would be in line with the Processional Theory which, after the old and new laws governing it have all been examined in every part and detail, presents such a perfect chain of evidence of its truth.

Another fact proving the previously molten condition of the earth is that in very deep mines there is a regular increase of temperature from the surface downward. This seems to be almost universal testimony wherever men have sunk shafts or bored wells to great depths. In some mines it is almost impossible to perform labor on account of the heat. There are many other reasons for believing the earth has been a molten mass; mountain ranges are caused by its contraction as the cooling process goes on and the great mountain ranges or "wrinkles" seen near almost every coast line show where the weight of waters gathered in oceans and seas, assist in pressing the crust into these wrinkles or ranges.

In volcanoes we find another proof. Many hundreds of these in various parts of the earth still act as vent holes or safety valves opening down into the molten center to allow the escape of gases and liquid lava when the cooling and contracting increases the pressure on the molten mass. Yet, with all these safety openings, when Mother Earth shivers and draws her blanket closer over her shoulders, while hastening onward toward the sun from which she came, thousands of lives are lost in the topp-

Fig. 13. Grand Canyon of the Colorado, showing stratification 7,000 feet thick.

ling buildings erected by man, and other thousands are buried beneath the lava forced out in the volcanic regions, by the closer pressing crust.

Judging by the time it has taken the sedimentary rocks to form and by the depth of the drift covering the first implements showing the handiwork of man, the very earliest and most crude human-like creatures could not have existed more than a few hundred thousand years

ago. If the record of the stars could have been kept from the very birth of man's intellect to the present time, there would probably be very little perceptible change in them so vast is the difference between 400,000,000 years, the estimated time between the birth of planets and 100,000 years the estimated time since human life began on the earth.

There are many treatises on what is usually known as the glacial epoch, that would make profitable reading for the student who would follow it and study the Processional Theory. Among the best of these, perhaps, is the work of Prof. John Fiske, called the "Journeys of an Evolutionist," and various other works referred to by him. The glacial epoch was undoubtedly caused by the cooling of the earth first at the poles, where it was coldest and where it was in darkness of winter twelve months instead of six as now. When the earth was near or where Mars is now, the water if there was any, first made its appearance as snow in the winter months and as rain in the summer months. No doubt when one of these long winters broke up and the winter pole was again turned towards the sun for a year, the sun's heat, assisted by the internal fires would cause a melting of snow and rushing of waters to the south, a filling of canals and hissing of steam as it hurried on toward the equatorial regions. We point to Mars as proof of this altho as we have already shown, Mars on account of its small size, must be considerably in advance of an ordinary sized planet in cooling.

The reason why a celestial body moves at all, is because it is falling towards its superior. This can be

easily shown by the motion of every satellite, planet, comet, sun or other celestial body. In the case of the earth we see it varies in speed at different partions of its orbit, falling faster when nearest the sun. When passing from the vernal equinox to aphelion, the farthest point from the sun, the attraction of the sun tends to check its speed; from that point to the autumnal equinox, the attraction being in the direction of its motion, the velocity is increased. The same principle applies when going to and from perihelion, the point nearest to the sun.

It is perfectly simple that every direction from the sun is up, until that part of space is reached where some other sun would be nearer or larger and so have a greater pulling force or attraction; except, locally at planets or satellites that have their own temporary centers of gravity while on their way around and to their superiors. The law of gravity discovered by Newton, should prove to any person of intelligence, that the sun being hundreds of thousands of times larger than any one of its family of planets, must have the superior attraction and the fact that the planets travel around it in an orbit, also shows that at any and every point in their orbits, it is drawing them towards it which necessarily makes it down from every point of the orbit of a body traveling or falling around it. If the planets were not falling toward the sun, they would stop. There is absolutely no other force to make them travel. Instead of stopping they continually increase their speed as they near the sun. This we prove by comparing the speed of Neptune, 250,000 miles per day, with the speed of Mercury; Mer-

cury in its fall has gained ten times the speed it had when at Neptune's orbit; and now travels at the rate of 2,500,000 miles per day. More than this, each planet from Neptune to the sun travels faster at a regular ratio exactly in proportion as it approaches the sun. (See table showing each planet, its distance from the sun and its speed along its orbit.)

The same law applies to the satellites of which a planet is a temporary center. Locally, of course, the center of the earth is down; at least as far out into space as the moon's orbit and we know the people on the other side of the earth stand with their feet down which is with the soles toward our feet when standing. The sun, however is 1,300,000 times as large as the earth; therefore the earth's local center of gravity is a small space when compared with the center of gravity for the whole solar system. See diagram.

There is another sure proof that the planets fall toward the sun and that, therefore, it is down from all the planets. This is illustrated in the cut showing an exaggerated eliptic orbit of the earth around the sun and which takes us 3,000,000 miles nearer the sun at one end of its orbit (perihelion), than at the other end or aphelion. When the earth is at the farthest end of its orbit, it is traveling at its lowest rate of speed, because it has left the sun 3,000,000 miles farther than at perihelion or, gone 3,000,000 miles farther up. Then as it travels the next six months back to the perihelion it has neared or fallen towards the sun 3,000,000 miles, gaining speed accordingly. When it passes its perihelion it is gradually going away from the sun for six months, and so travels

slower and slower, just as a ball thrown into the air does until it reaches the perihelion curve, turns and begins to fall. All these proofs of a real up and down in the solar system are shown by time, speed, length of orbits and proved by figures.

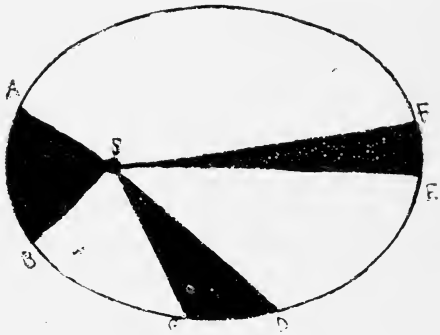


Fig. 14

The Radius Vector is the three lines in the cut represented by S A and S C and S E. When the earth has passed from A to B, the Radius Vector has passed over the dark space S A B in exactly the same time that it passes over the dark spaces S C D and S E F. The area covered by the three dark spaces is exactly the same; and the time in passing from A to B, C to D and E to F are exactly the same times. These facts and figures are absolute proofs that out or away from the sun is up to any part of the solar system and towards the sun is down from any part of the solar system.

As to the inequalities as represented by the height of mountains and depth of valleys, they are in about the same proportion to the earth's size as the inequalities in

the skin of an orange are to the orange. On a globe sixteen inches in diameter the earth's crust could be represented by ordinary wrapping paper.

That the earth is a sphere is proven in a number of ways: (1). All the celestial bodies that we can see are spheres and it is improbable that the earth is an exception; (2) when the shadow of the earth falls upon the moon during an eclipse, it is round; (3) vessels have sailed around the earth; (4) when a ship is sailing into port, the masts come in sight first; (5) the horizon expands as we climb a mountain or ascend in an airship; (6) the polar star is higher as we travel north, and, (7) if we climb a very high mountain that is in sight of the sea, we can see the curvature of the surface of the sea. Some theorists and speculators still suppose the earth is flat, some suppose it to be hollow and that we reside on the concave surface of the inside. The main argument of the latter is, that when a ship goes out of sight on the water, it may be brought back to the sight by using the telescope. This, if true, is caused by refraction of the rays of light by the atmosphere and is easily demonstrated.

IX.

VENUS.

The next planet toward the sun, in the same ratio and about half way from Sun to Earth is our very nearest neighbor, Venus. In size it is about the same as Earth and no doubt during the past 400,000,000 years, or a part of that time, has sustained life; more than likely human life. We can produce no reason to believe the material of which Venus was made was different from the material from which the earth and all other planets are made. This being the case, the conditions would be the same, and so, at the same distance from the sun, nature using the same material, under the same conditions, would probably evolve the same kind of life, both in plants and animals. If, then, in our solar system there is another planet supporting life, it must be Venus; but the probabilities are that the time has long since passed, when conditions were favorable to any kind of organic life.

There is now some well established doubt about Venus rotating upon her axis in the same time as the earth; and it is claimed by many astronomers that she rotates but once on her axis during her entire orbit around the sun; i. e., that she is held with one face to the sun continually. If this is proven to be true, then she is already a dead world; and we could not hope to find life, either

upon the side under the eternal blaze of the sun, or upon the side in everlasting cold and darkness. Venus is but a few hundred miles less in diameter than the earth; and when the two planets are on the same side of the sun, they are only 27,000,000 miles apart; so, by means of better telescopes, other instruments, and photography, we may yet be able to become better acquainted with our nearest neighbor, even during the present century. Some time, so far in the future that it is of little concern to us now, except to help us to understand our present surroundings, the earth will have reached the position of Venus; at that time, if there is a living creature upon our planet, we may confidently trust it will be the animal man whose brain power will enable him to conform to and provide against the changing conditions. According to the same reasoning it is possible that human life still remains on Venus; but it is not possible that it has yet commenced on Mars.

Venus receives five times as much light from the sun as the earth does; and if the atmosphere of Venus is very dense, the friction caused by the passage of light thru it, would greatly increase the heat. Some astronomers consider the brightness of Venus due to a metallic luster received from the heat of the sun. If the planet keeps but one face to the sun, it would certainly become greatly heated. This is made manifest on our own great deserts. In Death Valley, during fourteen hours of sunshine, the sand becomes so hot that it will cook eggs.

The orbital time of Venus around the sun is two hundred and twenty-five days or one hundred and forty days less than that of our own planet. The diameter of Venus

is 7700 miles. Its inner heat being gone, the crust has very likely taken all the water; as the crust of our own planet is doing so rapidly as it cools and condenses. The dense atmosphere of Venus that may be made up of the poisonous gases left by the inhabitants after their busy life (speaking collectively) of 400,000,000 years, is like a pall to hide her dead past from us; therefore little is known of her surface. One of her mysteries would be solved and the solution of the working of the solar system be made easier, if we could find, upon the surface of Venus evidence of her last moon. According to the proper procession herein demonstrated, her last moon should have fallen when she was near her present position; very likely since she was devoid of animal and plant life, when of course, the cooling and condensing had made the crust hundreds of miles in thickness. In case it fell when the crust was in this condition we should be able to find some signs of it, especially if it was any thing like our own moon in size, which is 2163 miles in diameter. No doubt so large a solid body would break up entirely, but in the absence of water, so large a mass should be visible in some direction. If the orbit of the last moon of Venus was about the same when Venus was at our orbit, it would perhaps take three-fourths of the time to her present orbit, for it to reach the planet and it would be gaining speed all that time.

Our own moon is but 239,000 miles from the earth and has gained four times its diameter in speed since the first recorded eclipses. When the last moon of Venus finally reached the planet, we can imagine the commotion it would make in passing around; and there can be

no doubt that it would break up into fragments after, perhaps, rolling around the planet a few times. If all this happened as it must have done, let us imagine the final condition of the moon and planet. Both would probably be cooled to the center. Certainly the moon would be entirely cooled and Venus would have a crust so thick that it could not be broken thru. The only nat-

Fig 15.—The moon as seen from the earth with the naked eye.

ural conclusion is then, that the moon would be broken into fragments. If so, there would be evidence of these fragments and also gorges and disfigurements of sufficient size to be revealed by the telescope. First it might naturally be supposed, that it would roll around the planet at or near the equator, perhaps many times. There is, however, no evidence of any such disaster and the mountains of Venus are about the height they should be

and should be on the earth 400,000,000 years hence after it becomes cool, almost or quite to the center. The mountains of Venus are estimated by some astronomers to reach the height of 160,000 feet. Lockyer's "Elements of Astronomy," note 265, says:

> Spots have been observed on its surface; and in irregularities in the terminator (shadow line) which are supposed to indicate lofty mountains, in some cases exceeding twenty miles in height.

Other astronomers estimate them to be as high as twenty seven miles or 142,500 feet. The evidence, therefore, points to the fact of its last moon having fallen as rings, in the same way as we believe a moon is now falling upon Saturn as shown in a preceding chapter. Such falling might in part account for the dense atmosphere.

One of the popular fallacies for sensational publication is that the celestial bodies contain great stores of wonderful unknown substances or are composed of diamonds, other valuable stones and precious metals. The fact is, however, that they are undoubtedly composed of the same material as the earth, having had the same origin, but, that at different stages of their existence, these metals and substances are in different forms or elements. Sometimes they are solid, sometimes they are liquids, sometimes gases and sometimes separated elements; but as they pass any given point on their way to the sun, their conditions are, perhaps, almost identical. Such facts as are well known, considered with good judgment, will not permit us to think otherwise.

X.

MERCURY.

Next, and still in the same decreasing ratio, from the sun half way to Venus, comes Mercury, still smaller and more dense; a world worn out and almost ready for the funeral fire which will finally add it to our monster parent. A dead world, like our dead moon keeping but one face to the sun, while it is being gradually dragged in, within reach of those great tongues of fire, reaching out hundreds of thousands of miles for material to keep them forever burning. Mercury has neither air nor water; and can be of no further use to nature, except to become firewood; donate its remains to the great central engine of our solar system, to be rejuvenated by the purifying dissolution and expansion by heat, again sent out as gas to the remote regions of space and again converted into material to form or help form a new world.

Mercury is 36,000,000 miles from the sun at aphelion; at perihelion, its nearest approach is 28,000,000 miles; and at such times the sun's heat upon it is twelve times as great as upon our earth. On the average it is seven times as great. All this blazing sunlight comes to but one side of the planet and must convert that side into a bake oven, while the opposite side is in continual darkness. A dead moon has a change of day and night, because its magnetic pole is turned toward its planet; a

dead planet turns its magnetic pole to the sun itself, and therefore can have no change of day or night, or change of seasons.

Every planet, satellite or particle of matter in the universe, be that particle a planet like Jupiter, or a microscoipc atom of dust, seems to have its north and south magnetic pole. This motion or guiding force, may be and probably is a part of the force of gravity. There are attracting and repelling motions in nature which we partially recognize, fail to explain, even deny in many cases, but which science must now recognize and set about to explain. These motions are most manifest in the magnetic needle and the common magnet. They are considered very mysterious; but there is no force in nature that cannot be found out and understood when we drop the idea of mystery, because force in nature is a part of nature; and all force in nature (as I have already shown) is made either by expanding by heat or contracting by cold; and no motion can be made any other way. These forces are directly related to the forces in the magnet and may therefore be easily explained when we find what causes the forces in the magnet.

Let us examine the magnet. First we subject it to great heat and find it has then lost all its so-called magic power. For the time being it has lost its mystery; and if we will follow this clew, it will lose its mystery for all time. If heat destroys magnetism, that fact alone proves that it is not a force of heat (expansion); and, as there is but one other cause of motion (contraction by cooling) it must be a motion of contraction or cooling. Even our own great sun has its north and south pole pointing in

the same direction and seems to be attracted by, or parallel to some great center of gravity, or community of interests entirely outside of the solar system toward which its magnetic pole points or parallels, until it reaches a point near enough its present center of convergence to be attracted thereto.

When a planet nears the sun, or a moon nears its planet, the smaller body turns one of its poles to the larger, just as a needle points to a near-by compass. Altho the magnetic pole of the earth is millions of times greater than the compass, yet the compass is millions of times nearer to the needle. This explains what has happened to Mercury; Mercury and the sun are one magnetically.

If the time ever comes when we can examine the solar systems of other suns, by means of larger telescopes or new methods, they will be found to be operating on the same principles and under the same laws governing our own solar system; and that the dead planets and moons are guided by the same kind of magnetic force that governs our own.

Like our Earth and Moon, Mercury travels around the sun in an ellipse; increasing its speed when nearing the sun and decreasing again when receding on the opposite curve. This proves that a planet increases its speed when it falls toward the sun; and that there is no other force in nature that can give a celestial body a speed, that not only lasts, but that continually increases as it falls toward its center. There is no mystery about it; from every planet, toward the sun is down; and from the sun is up; so, as Mercury is falling toward the sun, by nearing it in its orbit, we see it also increase its speed.

By examining Mercury with a telescope, we find it to be so near the sun that the sunlight interferes; so there is little hope of ever making any discoveries on its surface until new methods and better instruments are invented.

XI.

THE INNER ASTEROIDS.

According to the ratio governing the distance of planets from the sun there is room for, and should be at least one more small planet between Mercury and the sun. According to the self-evident facts developed in the Processional Theory, it is undoubtedly true that this missing planet is another case of Asteroids; a planet which for some cause has been disentegrated and formed a stream of fragments in the planet's orbit. There are many reasons for believing this to be the case. One is, there is no planet where there should be one and a still better one is that vast bodies of material (as already shown) are continually falling into the sun, exploding into gas, showing great black holes, sometimes thousands of miles in diameter and splashing firey fluids tens of thousands of miles in height.

An observation taken March 26, 1859, by L. Leverrier, is said to have revealed a small planet crossing the sun's disk about 13,000,000 miles from the sun. It was named Vulcan; and, for many years was supposed to exist. The greatest modern telescopes of today, however, even with the aid of spectroscopic photographs, fail to disclose any such planet. In case there was such a planet there at that time, it must since have disintegrated into small

particles that can be seen only as a part of the Zodiacal Light.

As a planet nears the sun and increases its speed, centrifugal force must greatly increase also; and there must come a point at which its centrifugal force outward from the sun and its gravity for the sun, would be so nearly balanced that any expansion by air or water, would overcome what little center of gravity it might have left; then it would be left without a center of gravity and become disintegrated. When once it went to pieces it would immediately become distributed into a belt around the sun; because the nearest pieces would have shorter orbits and gain on the others farther away, in every trip around the sun. That the space from the sun to Mercury is filled with innumerable small pieces of matter, is evident for several reasons; one of which is the existence of the Zodiacal Light. This is the name given to a faint, ill defined light extending along the zodiac, either in the east before dawn, or in the west after twilight. It so much resembles the dawn of twilight, that it is not ordinarily noticed; appearing to be a mere upward extension of it. Projected on the sky in the shape of a triangle, it inclines toward the horizon, the same as the ecliptic. During February, March and April you will find it in the west, after the sunlight has disappeared, reaching form the horizon in a pyramid, the apex almost to the zenith, where the constellation of the Pleades is located during Febuary and March each year. By noticing this light carefully, you will be able to locate the plane of the sun's equator thru space, upon which every planet, astroid, etc., revolve, and which you will notice

is at right angles to the Milky Way or Galaxy, surrounded by the nebulae or clouds of crystals beyond Neptune which are the material from which the big new planets are made. This light has been the source of much speculation and mystery. It was originally supposed to be the atmosphere of the sun; but if the Processional Theory is true, it must now be admitted that the sun can have no atmosphere, unless we call the colorless gas of expanded matter, atmosphere. This, however is entirely invisible and reaches upward from the sun, becoming less

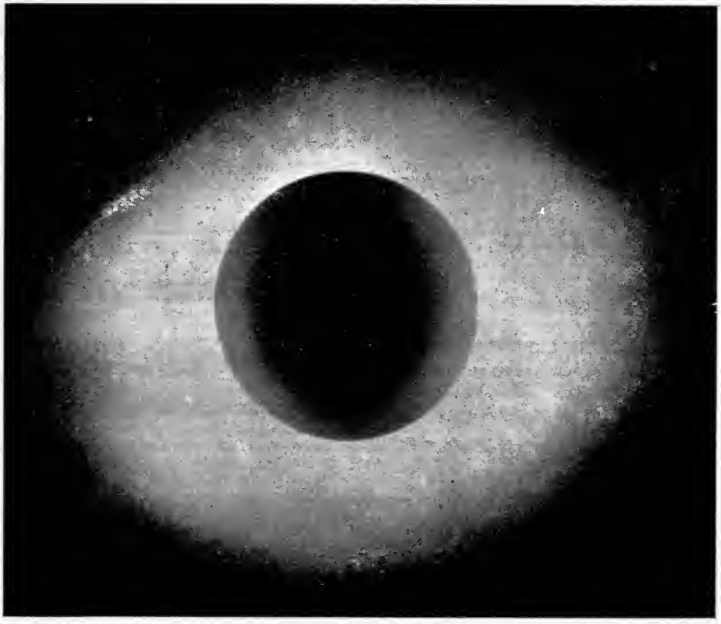


Fig. 16.—Corona surrounding the sun during a total eclipse

dense and more sensitive no doubt, until it unites with the same kind of gas from the nearest suns in space. The only rational explanation of this light is that it is reflected light from the smaller solid matter of decomposed planets and comets, which by reason of their great speed and centrifugal force, have lost their centers of gravity, gone to pieces and are hurrying to the sun, each in its separate orbit. Solid matter must fall towards the sun, which is down from every part of space in our solar system, according to the law of falling bodies, minus the check it receives from centrifugal force. If it were not falling in an orbit, there would be no centrifugal force and it would follow the exact law of falling bodies without any deduction; but even a comet has some motion of an orbit and therefore cannot fall directly into the sun. These facts, then, taken into consideration with the facts shown by the Processional Theory, explain simply and fully the cause of the Zodiacal Light and why it is more dense nearest the sun. Comets are known to be continually nearing the sun and they undoubtedly finally join this revolving mass of zodiacal matter, obeying the law of gravity and centrifugal force, (see Chamber's Astronomy, Vol. I., page 329,) finally adding their matter to help maintain the ever outward radiation of heat expanded gas from the sun.

By keeping a record of the sun-spots for a number of years, it has been asserted that the spots are periodical; much more numerous at some times than others. If they are made by the falling of asteroids into the sun, this would be most likely; because the orbits of some worn out comets, the pieces of which can no longer be seen,

would add to this mass, periodically, and thus contribute more falling matter at such times than at other times. These little bodies probably travel faster than any other members of the solar system. Giving them the same ratio of increase of speed which the other planets obey, they should be traveling on an average of 5,500,000 miles per day; but any matter that has come near enough to plunge into the sun, must be moving at the lightning speed of nearly 10,000,000 miles per day.

"Roots and Powers" by C. S. Gould of Manchester, N. H., says:

> It has been shown that the square roots of the distances of the planets are inversely proportional to their velocity of revolution. Hence, the nearer a planet approaches the sun, its velocity is more and more increased. At the distance of one mile, therefore, from the sun, the velocity of the earth's revolution around it would be 19 miles per second, and this multiplied by the square root of 93,890,000 miles (19 x 8638) would be 183,122 miles per second, and which is very nearly up to the estimated velocity of light.

No wonder then, that when one of them falls into the sun there are great magnetic disturbances thruout the solar system; at least as far as the earth, where records have been kept since it became safe to believe the earth is round, or to own a telescope.

Magnetic observatories are now located in all parts of the world. At these observatories magnets and needles are suspended so they will be agitated by any magnetic influence. In watching sun-spots, in connection with these delicate needles and magnets, it has been found that sun-spots cause them to vibrate.

At such times comes the splendors of the auroras in the north; but when sun-spots are few, the auroras and mag-

netic needles are at rest. There are many notable records in recent years of the influence of sun-spots upon these instruments, as well as upon the atmosphere and electrical conditions of the weather. This shows that the electrical or heat-force reaches out to every part of the solar system in its control of the motions of matter.

Sept. 1, 1859, was a day notable for electric storms and magnetic disturbances on all parts of the earth. In Europe and America telegraphic apparatus were demolished by over charging from nature. Flame followed recording pens and auroras of the polar zones reached almost to the tropics. Late in the afternoon, an English astronomer who was making observations of a group of sun-spots, saw two brilliant splashes of fire which traveled thirty-five thousand miles along the sun's disk in thirty-five minutes. On August 3, 1882, an observation was made at the Rocky Mountain observatory by Prof. Young who observed great splashes of fire on the sun, which he supposed to be eruptions; and at the same instant, when light had reached the earth from this fire, the magnetic needles in England and other observatories gave notice of the disturbance. Professor Young's needle was at the same time swung entirely clear of the scale. What excuse can astronomers offer for such great energy on the earth, other than is disclosed by this simple theory, the return of solid matter to the sun, its sudden disintegration and chemical reunion with the sun; so sudden as to cause the mighty explosions inevitable when heat should change solid matter into gas, tens of thousands of times larger in bulk, thus giving that great body

such an overplus of heat, that its equal in energy was instantly forwarded thru space with the velocity of light?

It is a simple, common sense explanation, which alone should give it the brand of truth.

XII.

THE SUN.

The sun is the great central engine of the solar system the center of the two great forces of the solar system, which are, heat and gravity. It is of comparatively small density, being so much expanded by heat; but it is 886,500 miles in diameter and therefore, 1,300,000 times as large as the earth in bulk. Its surface rotates at the equator at the rate of 4,400 miles per hour and much slower at higher latitudes as it is known to be covered by a loose envelope. On the plane of its equator and in the same direction, are traveling all the celestial bodies of the solar system, except the comets. This great body

Fig. 17.—Sun during total eclipse, showing flames and explosions tens of thousands of miles in height.

is supposed by physicists, philosophers and astronomers (who endorse the nebular theory) to be hopelessly loosing the energy and matter it radiates away. One of the late astronomers in speaking of the sun's energy, says:

> The supply cannot be infinite; how, then, can the radiation be maintained.

He does not attempt to explain, but merely asserts that the sun can last only five million years longer, when it will either disappear or become a dark, cold body; leaving the earth without heat or light, other than starlight from other suns. It does not seem to occur to him to inquire what becomes of all this matter. We know that matter cannot be destroyed and can only change its form temporarily, therefore there must be a place where all this radiated matter will change back to solid matter. This has already been answered and explained in preceding chapters, but it may be objected that there would not be enough returning matter by such a slow process as the returning of a planet once in 400,000,000 years. The answer of the Processional Theory is a double answer. First there is no doubt thousands of times more material going back to the sun in the shape of nebulous matter, sand, meteors and cosmic dust, that we do not see, than is brot, by the returning planets; and second, the wasting energy of the sun is not nearly as great as measured in our atmosphere by physicists (see Graduated Atmospheres) where the motion of light is passing thru it at the rate of 12,000,000 miles per minute must create great additional friction caused by the resistance of the atmosphere, and consequently add to the real heat of the sun. Going to the top of a

high mountain where the air is very much more rare than at sea level, we find it much cooler altho nearer the sun. There are even snow capped mountains under the very equator; and if we could measure the heat outside of the atmosphere, where the motion of light travels with less resistance, we might find the heat very much over estimated. Of one thing we may be quite sure that

Fig. 18.—Nebulæ which a large telescope dissolves into suns.

what goes up from the sun, must come down again. In any event we can safely trust the force of gravity to carefully guard, collect and safely return, every particle of matter, to the smallest fraction of an ounce, that the force of heat disintegrates and sends out as expanded gas.

We can begin to realize the vast amount of unseen matter being recieved by the sun when we consider the meteors that fall upon our own little planet. It is estimated that one million meteors of various sizes fall into the earth's atmosphere every hour. The sun being 1,300,000 times larger, would recieve that many times as much more, multiplied by its additional force of gravity.

From Neptune the sun appears 900 times smaller than from the earth; how much smaller must it appear then, from the nearest fixed star, Alpha Centuri, which is 25,000,000,000,000 miles away? From there it would appear 2,699,700 times smaller. Indeed it is quite doubtful if it could be seen at all by human eyes at so great a distance. The pole star is twelve and one-half times as far away as Alpha Centuri and it requires 50 years for light to reach the earth from it—a distance of 312,366,700,000,000,000 miles. Astronomers estimate that Arctaurus is one million times more distant than our sun and that its size would more than fill the orbit of Neptune around the sun. These figures, altho incomprehensible, give us a hint of our comparative unimportance when considered as a part of the universe and nature, when compared with our own near surroundings. These suns are our nearest neighbors in a sea of untold trillions, appearing smaller and smaller as they are farther away, until their apparent

small size and great numbers, finally melt them into mists of white fleecy clouds. Our own sun, great as it seems to us, would possibly never be missed by our nearest little neighboring sun, if wiped entirely out of existence. What monstrous planets some of these big suns must have in attendance, upon which we would appear as microbes, to any life that they would evolve! Compara-

Fig. 19.—Showing that the sun is constant explosions which throw flames and masses of fire tens of thousands of miles in height.

tively our earth would not be larger than an ordinary adobe marble; that is to say, it would take as many earths to make one of them as it would take adobe marbles to make an earth.

We are in ignorance of the sun's orbit, because we do not know where it is going or what is the center of its orbit; but we may be quite sure that it travels on an orbit

from west to east. Following the law of gravity, there can be no doubt but that it is gradually falling in an orbit towards the nearest sun, Alpha Centuri, and that Alpha Centuri is also falling towards our sun in an orbit, thus forming a binary system of suns. If there are any other suns in this binary system, we cannot at present tell. Modern astronomy shows conclusively that there are many double stars or suns, which make orbits around each other. Sometimes there are more than two, consisting of triple and multiple stars. Castor is a double star, in a telescope of modern power, one of them being of the second, and the other of the third magnitude, within five seconds of each other. In some cases the distance between these stars is less than one second and they are traveling around each other with a speed so appalling that it is beyond the power of the human brain to comprehend it. Indeed the nearest of these binary systems is so far removed from the earth, that it is scarcely possible to more than estimate their distance. The variable star Argol has an orbital period of sixty-nine hours. It is a star of the second magnitude, but for seven hours is partially eclipsed by a monster dark body or a number of them, and its minimum, is reduced to a star of the fourth magnitude for twenty minutes, when its luster is gradually restored. These great bodies, must then be flying around each other separated by a distance of only about 3,000,000 miles. We can form some idea of their great distance from the earth, by comparing their orbits to the rim of a one cent piece, removed to a distance of ten miles from the observer. By the perfect methods of mathematicians, the astonishing fact has been shown,

that where a binary system is formed of two suns, the motion of each is performed in an ellipse, which contains

Fig. 20.—Showing that the sun is a glowing, burning mass of flame.

the center of gravity of the two suns in its focus. One of the finest binary stars is Castor which is divided into a star of the second magnitude and one of the third. The polar, or north star, is also a binary; its companion being much smaller, of the ninth magnitude only. Mizar, in the constellation of Ursa Major, the middle star in the part called the tail, is also a beautiful double star. Lyrae is a most interesting double star, each part of which again a double, making a double double star. The entire star consists of four stars in two pairs; the pairs revolving around each other, and the two pairs also revolving each other. This we see makes a very complicated set of motions to be dealt with by mathematicians.

Prof. Burnam of the Lick observatory had discovered one thousand new double stars, as early as 1897. Some of these stars are thousands of times farther away than others and their distance can only be estimated by cal-

culating the diameter of the telescope required to bring them into view. Some of our comparatively near neighbor suns are so immense that they would fill our earth's orbit around the sun; yet they obey the same laws that govern the procession of planets in our own solar system, are gradually approaching each other and when they finally come together, will present the phenomena of a burning Star as did the "New Star in Perseus" that appeared so suddenly in that constellation on the 21st day of Feb., 1901, and in two days reached the brilliancy of a star of the first magnitude. The great speed shown later in the revolving mass composing this new star, considered together with its great distance from the earth, makes conclusive evidence that it is not a melting planet, occupying a position in another system corresponding to the position of Jupiter in ours, but that it was a binary system of suns that fell together. Soon after its first great light had subsided, it was seen to be spreading and occupying a larger space. Later, about November, it was found that portions of the mass had moved thousands of millions of miles apart in orbits, with almost the velocity of light. The distance from the earth is so vast, that the speed cannot be accurately determined; but it is appalling to astronomers, and all this goes to prove that the new star in Perseus was not the result of the melting of a first class planet in a solar system, but on the much larger scale of a binary system of suns, explainable only by the Processional Theory.

Now according to the Processional Theory of the Motions of Matter, a sun must gradually shorten its orbit and increase its speed, by exactly the same law that

planets and other bodies follow. They with their whole system of satellites, must be continually nearing some center and gaining speed upon their mighty orbits. In the case of our own sun, its orbit is so great that we can have no conception of its size, or of which, or how many of the burning stars in sight are its binary companions. One thing seems reasonable; our sun must be in the hey-day of its youth, as it appears to travel but 45,000 miles per hour thru space; and when we remember that a planet gains a speed of 2,500,000 miles per day, by the time it reaches the orbit of Mercury in our own little system, we can begin to have some vague idea of the speed a sun would gain in reaching the center of its convergency in an orbit so immense that it must take millions of times longer to reach its center, than it does a planet. Does this, then, not explain the phenomena of the "burning star in Perseus"? When two great suns and their solar systems, finally come in contact after revolving around each other with speed of light, would, or could any thing happens, except just what the spectroscopic photographs show has and is happening to this new and astonishing star? It is almost marvelous that two suns when traveling at such a rate of speed, could hold themselves together until they could touch each other; but, the moment they did touch, there could be no other result but the great heating and lighting which did take place in this example; and when their masses were torn to pieces, in this condition of heat and gas, revolving with the speed of light, their centrifugal force and the expanding force of heat, would destroy their centers of gravity for each other and they would at once distribute the larger part

of their matter over a circular space, billions of miles in diameter, the ellipses of which would correspond with the ellipses of the former suns which made the vast seas of matter with its burning central suns. Then must commence again the process of a new solar system for each; with new planets forming on their uppermost edges, gradually falling back to the center force or suns, which are always expanding matter into gas and thus as we see

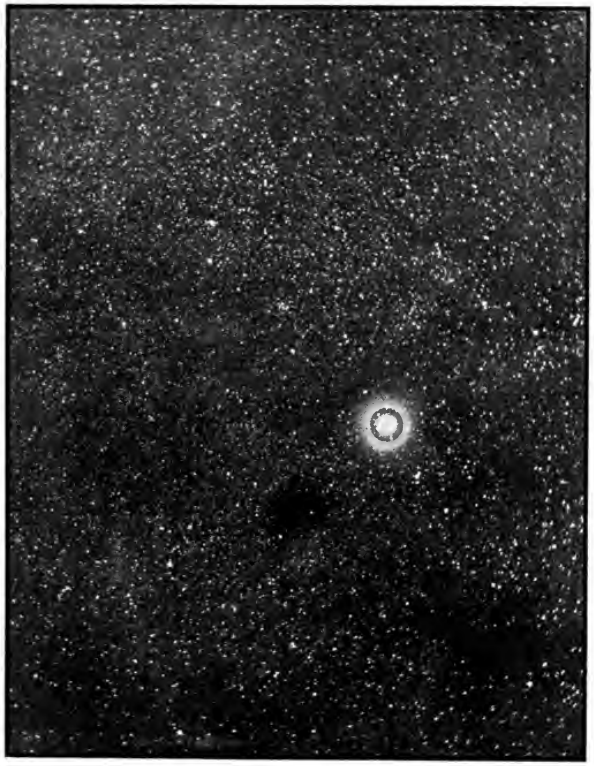


Fig. 21.—Photograph of Milky Way, taken at Sidney, Australia.

forcing it up again by a comparatively never-ending procession of expanded colorless gas from the centers and ponderable matter falling back as planets, satellites, asteroids and comets to the centers.

The outside of the sun, at least, is a great burning mass of fire containing all the elements found in the earth. Its heat is many times greater than the most intense electric heat that can be generated at the earth. Argo determined that the light of the sun is of the nature of burning gas or flame; and analyses show that the atmosphere is composed of gaseous matter in intense combustion or chemical friction.

In our study of the Inner Asteroids, we have seen that by a carefully arranged and complete system of magnets and needles at the earth, it is found that sun-spots and explosions on the surface of the sun are followed by the vibration of these suspended magnets and needles, thus plainly showing that something has happened at the sun to cause it to send out such additional energy from itself with the speed of light, as to cause these vibrations. The cause of the heat and light from the sun and the cause of the periodical energy that vibrates needles and magnets at the time of sun-spots, has been to science the unknowable mystery of the sun. The only theory that can or does explain the apparent mystery, is the Processional Theory. The explosion and the great whirling black hole which gave due notice eight minutes later at the earth (not only by vibrations on the human eye but also by vibrations on and oscillations of suspended magnets and needles) can be none other than effects produced by the collision and chemical friction of disintegrating matter

which, reuniting or fluxing with the burning matter of the sun, almost instantly expanded into bulk, tens of thousands of times greater than when it enters; thus causing the jarring of the whole sea of expanded matter between the sun and the earth where the needles and magnets wait to receive it.

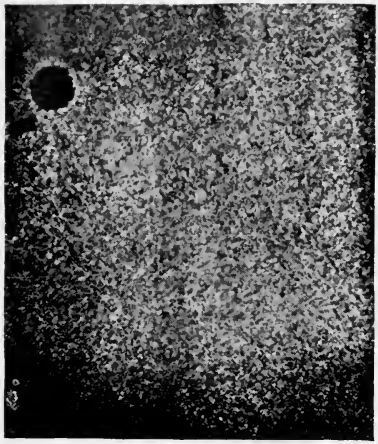


Fig. 22.—Janssen's photograph of Solar Disc, showing granulations or tops of prominences and one spot.

For the sake of illustration, let us suppose an asteroid, ten miles in diameter should fall into the sun. If this Processional Theory be correct, its speed would be about ten millions miles per day; or, 68,000 miles per minute. This must send it thousands of miles into the sun before it can possibly be expanded into gas. No hole would be seen at first, but it would not be a minute perhaps, until, instead of occupying 1000 cubic miles as solid matter (if it were ordinary rock) it would occupy a space of 11,000,-

000 cubic miles as expanded gas. Now, what could happen but a great explosion, leaving a hole exposing the deeper parts of the sun, and shooting fiery flames and gases, tens of thousands of miles in height? Altho the solid matter fell into the sun, the explosion would come outward; and as it went in, it would have its axial motion (as returning and outgoing matter has) so that the hole made by the exploding gas would have the motion often noticable in the spots and firey explosions spoken of as "cyclones."

The enormous collision that must be the result of stopping a speed of 68,000 miles per minute, and the chemical friction generated by its fluxing, would cause an immense additional heat in the sun. This might be illustrated by adding a gallon of gasoline to the fire in an already hot stove. The jarrings or vibrations of this gas from the sun, would send its impulse up from the sun with the speed of light. The more heat, the more rapid the vibration and consequently the more friction and also more pressure at the earth.

What but the explosion of a great lump of matter into gas, could give the whole body of expanded gas between the sun and the earth, such an impulse as to force the suspended magnet to move clear of its scale, as noted by Prof. Young at the Rocky Mountain Observatory?

If the heat from the sun was regular and constant, we might conclude that its source of supply was only the radiation of its own material as per the nebular hypothesis; but when we know and measure its irregularity, must we not look for a reason that will make it consistent with natural causes? Let us return to the gun barrel

filled with bullets, to illustrate the effect of the unusual amount of heat following the sun-spots: Suppose we hang a magnet at the muzzle of the gun, where a bullet coming out would move it the distance of the diameter of one bullet. If we could instantly push ten bullets in at the breach, we would instantly move the magnet the distance of the diameter of ten bullets. Rodger's Theory of the Universe says of sun-spots:

* * * But what shall we say of the so-called sun spots which appear as if located on the face of the sun? The sun heat, sun light and sun dazzle, the corona and prominences, all appear quite as real as if located at the sun; and shall this spot phenomena prove an exception to this great rule? All these have proved to be mere superficial appearances, so far as the sun is concerned; then why should not the sun spot be classed with these as purely an optical illusion? That it is such an illusion is now demonstrable. Thus single spots and groups of spots, which if located at the sun itself would occupy an area of millions of miles, appear and disappear instantaneously. This implies velocities wholly impossible. This phenomena is therefore an illusion, so far as being located at the sun is concerned. * * *

That a sun-spot is on the sun is very easily proven by spectroscopic photographs of a spot, taken at regular intervals as it travels with the sun's rotation from west to east. When it passes half way across the disk it is nearest to us and shows the full size; then it gradually grows narrower till it presents a dark line paralel with the sun's edge; and when upon the very edge of the disk, it shows an indenture in the sun's surface which we illustrate in the following cut, representing six photographs of the same spot taken at noon on six successive days. This is conclusive evidence that the spot is on the sun and not in the eyelashes of the observer. Not only this; it proves

that the sun is a sphere and that it revolves on its axis in about four times six days.

Fig. 23.

Not realizing that the planets are continually being formed in the region of nebular clouds beyond Neptune, but believing they fall into the sun, Dr. Meyer says in 1905, in his book "The End of the World," page 132, after showing how the moons disintegrate into rings and fall to their planets:

* * * The same interplay must take place between the planets. One after another the planets will have to reunite with the sun. And whether a planet drops all at once, or whether it is first transformed into a ring and then falls piecemeal very gradually, the result will be essentially the same. In far off future ages the sun's diminishing supply of life-giving heat will be replenished, in the one case suddenly, therewith causing the sun to flare up brightly as a new star, in the other slowly and in gradual additions. Still, sometime the last planet will have dropped upon the sun and the last particle of heat generated will have been radiated into space. All the material which upbuilt the splendid sun and its train of planets with their richly varied life, will have become a single mass, cold, dark, inert, rolling thru the empty void of space without end, without aim. This is the last, the very last end of the solar system. Is there anything that could ever again awaken it into new life, after its life giving heat has thus been completely spent? All bodies move restlessly thru space. There is no star in the heavens that stands still. Whatever else may befall it, it moves on and on. Even after it is dead and burnt out it continues

on its way. The terriffic force* that impels it survives thru all the catastrophes which it undergoes. But the dead orb cannot transform this energy of motion into vital power for itself, since only a difference of motion can set up a movement to and fro among the rigid particles, of which the cold burnt out sun is composed. But by virtue of inertia, the universal property of matter, every change of motion requires the action of a resisting force. And this force is lacking as long as no body from without acts on that dead mass.

This is exactly what would and will happen; but not when the present planets have all fallen into the sun, because, as we see, new planets are being continually formed in the zone of nebulae beyond Neptune. The matter of the sun, augmented by the return of the planets may be thrown out and returned thousands of times before the sun reaches its binary companion, just as the water of the sea may be evaporated into clouds and fall as rain and snow upon the earth thousands of times before it has all disappeared into the earth's cooling crust. The inertia, spoken of by the Doctor is in this case, simply falling; or gravitation towards its binary companion. There is another inertia, overlooked by him, which sends them apart. This, as we all must see, is the expansion of heat, which, added to the immense centrifugal force they have gained by their increased speed, sends them as far apart as they ever were.

The uneasiness of some scientists and astronomers lest some stray planet, sun, comet or other celestial body may sooner or later collide with and destroy the earth, is as needless as are the sleepless nights passed by people who imagine the forests may pass away, or that the supply of coal and oil will be exhausted. It is as impossible for

*Falling, of course.

two planets to collide, as for two fans of a windmill to collide. When we consider that expanded matter or gas from the sun condenses into dust and gathers finally into a world which then falls in a spiral orbit to the sun, it is

Fig. 24.—Hale's snapshot of Solar Prominence. March 24, 1892.

plain that each planet in order to form, gathers by attraction the material within hundreds of millions of miles from it, including the lesser independent bunches which form its satellites. This expanded matter or gas when leaving the sun has the motion and speed of the sun's equator and must always continue in the same motion from west to east; therefore, the new planet must have the same motion around the sun that the gas had. This leaves no possible chance for a planet to travel from east to west, or to meet another planet, even if two could be formed in the same belt or orbit of crystals. When a planet has been formed from this consolidated gas or dust it has by that time (the first four hundred million years), fallen half way to the sun; leaving the vast field thru which it gathered itself, to the solidifying gas out of which in the next four hundred million years) the next planet will be formed, thus leaving a clear field for each

planet as it comes in. It is true that comets, asteroids or meteoroids may cross the earth's orbit, but they are small; and if they should actually come within the earth's attraction and finally fall upon its surface, the chances are two to one that they would fall into the sea. Then if they were large enough to make a tidal wave, they might perhaps drown a few people. Should they happen to fall upon the land, the catastrophe would probably be less fatal than a cyclone in a city like St. Louis, or an earthquake in San Francisco. True, the satellites of the planets fall upon them, one at a time, as they reach their planet; but they undoubtedly go to pieces and fall gradually; most of them burning, or changing back into gas, in their atmosphere. When the earth was at the present orbit of Jupiter, it no doubt had as many moons; but they have fallen one at a time, most of them no doubt, before human life had evolved. If the inside moon of Mars should fall bodily upon the planet at this time, it would only injure plants or possibly a few serpentine animals, as the planet must still be too hot to have evolved much higher life than vegetation. Our moon is approaching the earth and gaining speed as it falls; but it will reach the earth no doubt, about the time the earth turns one of its magnetic poles to the sun and thus destroy all organic life.

That which applies to moons and planets must also apply to suns; and these bodies can only meet in binary systems and again be forced into space from which they came. A celestial body cannot travel unless it is falling to some other body or is being thrown up by heat and centrifugal force. The other body is also falling and they cannot fall straight together since, as we have seen, the

motion of both is orbital (or circular) causing them to make vast orbits around each other. Thus we see it is an utter impossibility for any celestial body to meet with or crash into another, except as compelled by the laws governing the procession of celestial bodies, and which is made by the opposing forces, heat and cold.

As the sun is continually expanding matter into colorless gas at its surface, and pushing the gas above it, further up as more is expanded from below, we must admit that when it leaves the sun it travels in the same time and direction as the equator of the sun, which being the most active zone, must throw off the most matter; and as the orbital speed of the sun at its equatorial zone is 4,400 miles per hour, the gas thrown off here must take the same direction and rate of speed on the plane of the ecliptic or equatorial zone. As it is pushed farther and farther up, by the expansion of the constantly forming gas from below, it would have a continually lengthening orbit; therefore it would continually take it longer to complete its next orbit, even if it kept up the speed of 4,400 miles per hour. For the sake of argument, we will say there is no friction and it never loses this speed until at the end of billions of years it has reached the regions of immeasurable cold, say twice the distance of Neptune from the sun. Of course there may be some friction and therefore a loss of speed on account of the shorter orbits of the atoms of gas towards the sun. As gas is swelled and pushed up from the sun below, its weight is upon the gas below, and therefore is continually becoming lighter as it goes up; the gas next the sun is condensed, because of the weight of all above it, the

same as air is more condensed at sea level than on a mountain top, or as water is more condensed as we go down in it. The pressure under water increases so fast that an ordinary man, unprotected, will be killed at a depth of 40 feet. Figure 25 will illustrate what I

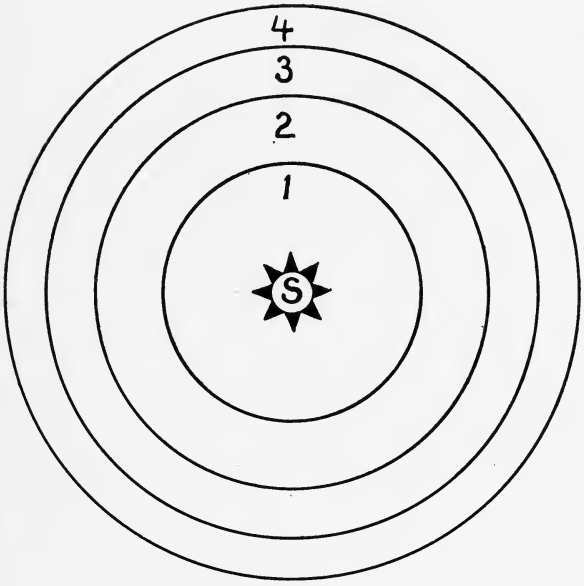


Fig. 25.

mean by the same gas filling the same space (and the more as it gets lighter) in larger orbits. In the space (1) which encircles the sun, the size of the surface is the same as (2), (3) or (4). You perceive it leaves the sun less and less rapidly, because it has a larger circle to fill; therefore the same body of gas will occupy a narrower belt because it is so much larger in cir-

cumference. Half the distance to the nearest sun center, is twelve million, million miles; and we can understand that up at that point the gas must be very thin and light. We must not forget that motion (which is light, heat, electricity, sound, etc.,) will certainly travel at greater speed thru gas that is light, than thru gas that is heavy. The reason why we have light in an incandescent bulb, is because the platinum wire makes a resistance to the motion of electricity, which then makes the friction of light and heat. Therefore, as expanded matter is swelled up from the sun in greater orbits, more space is filled with the same gas, because it is less dense, having less weight of gas above it. This is the outward pressure that Prof. Lebudue has called "The Outward Pressure of Light." If he has measured it any where near correctly, he should be able to find a measurable difference in its speed at the opposite ends of the earth's orbit, as there is a difference of 3,000,000 miles between its distance from the sun at perihelion and its distance at aphelion.

We know this gas must finally reach a region so cold that it cannot remain expanded; let us suppose it to be the nebulous region beyond Neptune, 6,000,000,000 miles up from the sun; what must take place then, but a slow and gradual collection of dust into little bunches that attract each other until finally the foundation for a new world is laid, with an orbital motion and speed inherited from its parent, the sun? Every atom of this newly formed planet must have this "inheritance" or motion of the sun, and every planet is a collection of motion as well as matter. The orbital motion cannot stop or

change because it is only the extended motion of the sun, of which all things in the solar system are a part, whether visible or invisible, whether swelling up by expansion

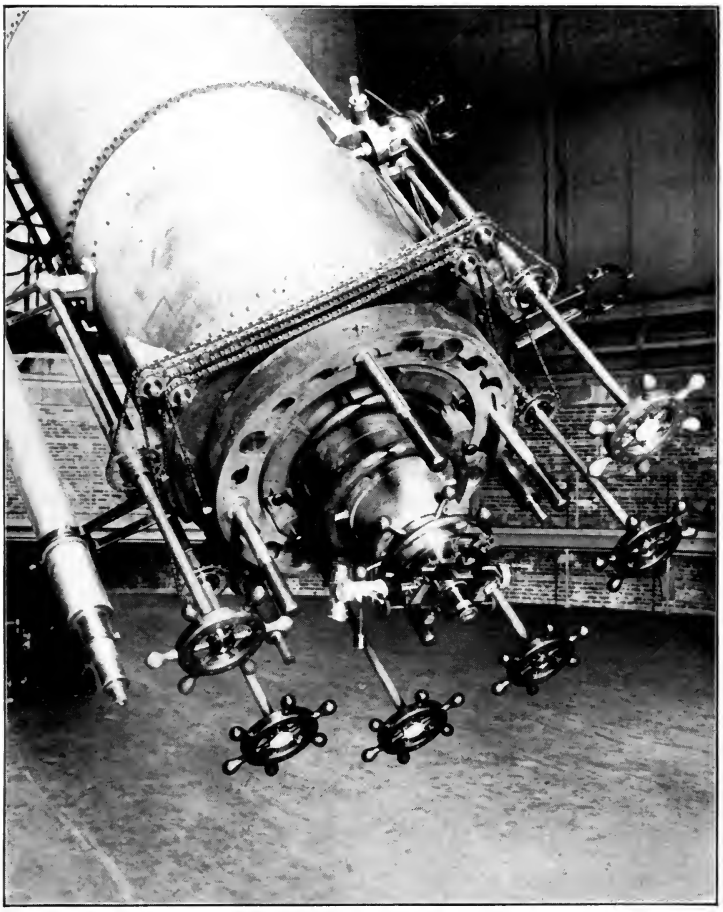


Fig. 26.—The Eyepiece of a Great Telescope

of heat, or falling back to the sun as ponderable matter. So also we can say of the axial motion or any other motion they may have.

When we understand how and why the solar system keeps itself in motion, how our sun is supplied with heat, light and material with which to make new worlds, there will be time then to hunt up a binary system or larger cycle of revolving matter to which we belong. No doubt the individual members of our binary system are revolving from west to east, and that as a system it is revolving in the galaxy, from west to east; that that galaxy revolves from west to east, and that all the galaxies both visible and invisible do likewise. If we once get the idea that a solar system is a self-operating machine, the center and engine of which is a sun, that every direction from one of these suns is up, every direction to it is down and that its fires or force is maintained and fed by the continual return of matter from the regions where the gas is cooled, the continual turning or returning, we can understand that matter can never be motionless or destroyed. (Universe is from the Latin, "uni", one; "ver", to turn.)

At first it would seem to us that it would take an atom of gas vastly longer to travel from the sun to its outward limit, than to fall back to the sun as solid matter; but it must take the same time to the fractional part of a second to make the upward trip, that it takes to make the downward trip. This is because the acceleration of motion is reversed at the upward and downward end of both journeys; that is to say, matter recedes from the sun more and more slowly as it goes farther up and re-

Fig. 27.—Nebulæ which cannot be dissolved into suns.

turns more and more slowly (that is, approaches the sun) because of the centrifugal force generated. We

find Neptune approaches the sun 1,570,000,000 miles in the same time that Mercury approaches the sun 15,000,000 miles; for the reason of the centrifugal force generated by the continually increasing speed of falling. One of the atoms of expanded gas on its upward trip is forced to leave the sun by expansion thousands of times faster at Mercury's orbit than when at Neptune's orbit, for the reason of its orbit continually increasing in length and therefore it takes more gas from the sun to fill each succeeding outward orbit. All this may be easily proven by the mathematical calculations of any one competent to do the work. It would include the difference in the weight of the gas, as it became less condensed up from the sun. To illustrate more plainly, let us take Sir William Thompson's 400,000,000 year period between the age of planets as a standard and say that from the time an expanded atom of gas leaves the sun until it reaches the orbit of Neptune would be 400,000,000 years or the same time that Neptune will require to reach Uranus. In other words, that the atom of gas must travel as far from the sun during its first 400,000,000 years, as a new planet falls towards the sun during the first 400,000,000 years of its return. The next 400,000,000 years, the atom would only leave the sun about half as far, but the space to be filled with gas would be the same as the space filled during the first 400,000,000 years, thus reversing the process of the speed of the returning new planet.

I do not make these calculations with any claim to

exactness, but with the idea only of illustrating the motions of matter on its upward trip from the sun and its returning or falling back to the sun, as contracted or solid matter.

XIII.

MOONS.

There is an interesting fact in connection with the moons or satellites of planets, that certainly points to the truth that the planets are of different ages. Commencing at Venus and going outward, we find the moons arranged in numbers as follows:

	Number of Moons
Venus	0
Earth	1
Mars	2
Asteroids	? (4)
Jupiter	7
Saturn	9 (known)

We will discuss the moons of Uranus and Neptune later inasmuch as they are so far away that only a few of them can be seen and seem to be traveling in contrary orbits and deserve to be considered as comets or satellites not having reached their orbits as regular moons.

The question now is, why do these planets lose their satellites as they approach the sun? Why has Saturn nine moons and Venus none, with a gradual decrease between? Saturn's moons travel around it in the same direction that the planets all travel around the sun, on the plane of the sun's equator. The outside moon of Saturn is farther from the planet than the moon of any other

Fig. 28.

planet whose moons we can see, and the outside moon of each planet as we come in towards the sun is closer to the planet and traveling at greater speed. The moons of Jupiter are near enough to make it possible to measure their distance and speed with considerable exactness. Four of the moons of Jupiter may be seen with an ordinary field glass and the largest one can sometimes be seen with the naked eye, from high mountain tops in such a climate as that of Southern California. In the largest telescopes they show in considerable detail; enough so that moon I, is known to be held with one face towards Jupiter, having either turned one of its magnetic poles to the planet, or elongated, the same as our moon is held by the earth, and the same as the earth will sometime be held by the sun, as Venus and Mercury are now known to be held. These four moons numbered from the planet outwardly I, II, III, and IV were the first objects upon which Gallileo turned the first telescope ever made. In 1892 Prof. Bernard, noticing the perfect ratio in the distance and speed of these four moons, decided that at the proper ratio of distance, there should be another moon between Moon I and Jupiter; and sure enough, after considerable pains he found the photograph of it on the sensitive plate, and very small; 112,500 miles distant, or less than half as far from Jupiter as our own moon is from the earth and making its entire orbit around Jupiter in eleven hours and fifty-seven minutes and twenty-two and six-tenths seconds.

The following table shows the name, distance, time of orbit and speed of each of Jupiter's satellites.

Name	Distance	Time	Miles per day.
Bernard's	112,500	12 hours	1,350,000
I	278,500	42 "	960,000
II	495,000	85 "	754,000
III	605,000	171 "	580,000
IV	1,160,000	400 "	415,000

In examining these moons and their various relations to the planet, the evidence they give of the truth of the "Processional Theory" becomes almost startling to one who has not been a student of it. In the first place, the moons follow the same law of ratio in shortening their orbits and increasing their speed, that the planets do in approaching the sun, that the sun itself must follow,

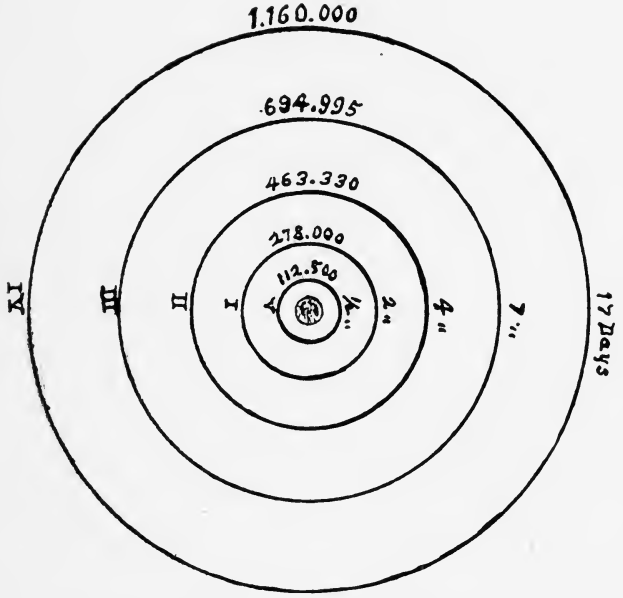


Fig. 29.—Jupiter's Moons. Since this cut was made two more moons have been discovered farther out at same ratio of distance and speed.

The outside circle shows the size of original supposed nebula which would turn as the rim of a wheel, as the whole mass turned.

} Belong under Fig. 5. p. 29.

in approaching the center of its binary system and in fact, that all condensed matter must follow as it falls in an orbit to its center of convergence.

The little moon discovered by Prof. Bernard, we must notice, is traveling at the rate of 1,350,000 miles per day and must have gained this speed by falling towards Jupiter. According to the Nebular Theory, it should have been thrown out from Jupiter, in which case it would of course have Jupiter's equatorial speed, which is only about 600,000 miles per day; less than half the speed it does really make. When we get into the belt of Asteroids, this side of Jupiter, we find, as we know, the remains of what we have every reason to believe was once a great burning world in the evolutionary stage from a first to a second class planet, leaving no record of moons, but entitled to no less than four according to the regular ratio of satellites. Within the last few years several large bodies have been discovered in this belt or orbit of the Asteroids, one of which is now believed to be almost the size of our own moon, and three others larger than the greater moon of Mars. No doubt these four large Asteroids may really be the outer moons of the unfortunate body. The inner one may have been broken up in the explosion, since being such small bodies, they must all have been cooled; but it would hardly be likely to break up the outer ones. The outer one should have been 600,000 miles out from the planet in making its orbit, 1,200,000 miles in diameter. We may be sure there are at least three large bodies in the orbital path of the Asteroids; and it is more than probable they are the moons wanted as witnesses.

When we reach the little planet Mars, we find the number of its moons in the right ratio, but their size and their distance from the planet is in proportion to the size of that little world. Both of them have turned their magnetic poles to the planet, and Phobus, the smallest and nearest, has reached such great speed in its fall, that it travels around the planet three times, while the planet itself rotates once; and thus as we have seen, it rises in the west and sets in the east.

Some moons may be large enough to have created internal heat as planets do, by the friction of their loose, hence grinding matter causing them to melt as planets do and as our moon seems to have been melted. One of the moons in Saturn's retinue, a very bright one, may no doubt now be in a molten condition.

In one particular, moons are different from planets; they cannot keep up their procession. As each moon is drawn into the planet, the planet has one moon less as we have seen, because all moon material is being used by the new planet till both go into the sun; whereas, when a planet is drawn into the sun, a new planet is forming and collecting its moons.

When we reach the earth we find our moon, 240,000 miles distant, making its orbit in 28 days and with one magnetic pole turned to the earth. It is known to have gained on its orbit four times its own breadth since the first recorded eclipses. Prof. Whewell's Bridgewater Treatise, page 128 says:

> The fact really is that changes are taking place in the motions of the heavenly bodies which have gone on progressively from the first dawn of science. * * * The moon has been moving quicker from the first recorded eclipses and is now in advance about four times her own

breadth of what her own place would have been if it had not been affected by this acceleration. * * * The obliquity of the eclipse also, is in a state of diminution and is now about two-fifths of a degree less than it was in the time of Aristotle.

Here we have proof that the moon is increasing her speed and shortening her orbit. The same infallible law carries her nearer to the earth, which carries the earth to the sun and the sun to its binary companion.

The moon seems to have been a molten body at some

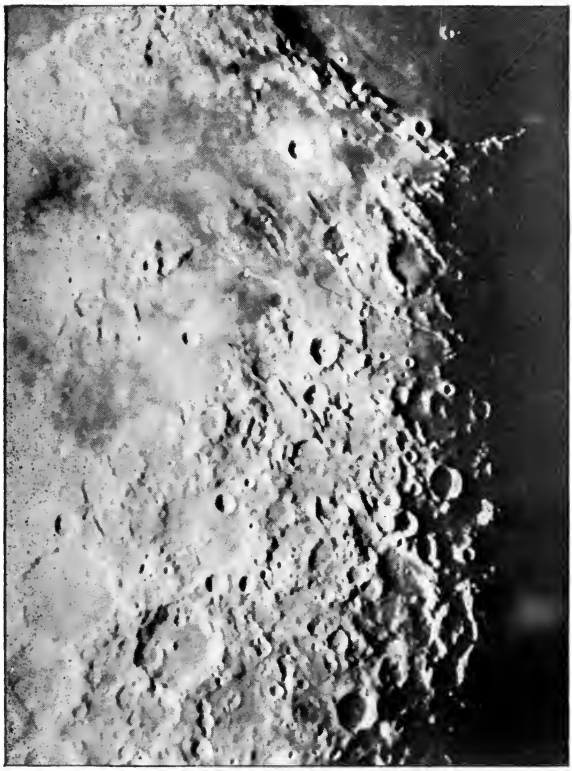


Fig. 30.—Showing where the moon has been pitted by falling meteors or asteroids.

remote period, but being so much smaller than the earth, it has apparently cooled to the center and absorbed all its atmosphere and water. In contracting it has raised mountains, that, in proportion to the size of the earth, are five times as high, showing that the crust is immensely thick, if indeed not cooled to the center.

One of the most curious and most interesting objects on the moon, are its ring mountains which are supposed to be extinct volcanoes. These happen almost any place on the moon's surface; on the mountains, plains or old sea beds. They are of all imaginable sizes in diameter, from a few hundred feet to more than a hundred miles and have all the appearance of asteroids and meteors having fallen on the surface. One of the most prominent objects on the moon, is the so-called crater, Copernicus. The details of the crater itself and of the immediate neighborhood, reveal the unmistakable evidence of a meteor having struck there. Lockyer's "Elements of Astronomy," page 119, says:

* * * The depth of the crater floor, from the top of the wall, is 11,300 feet and the height of the wall above the general surface of the moon is 2,680 feet.

Here, then, is an enormous hole thirty miles in diameter and more than 9,000 feet below the surface of the moon. The entire matter of the wall around it, which is above the surface of the moon, if scraped off level and thrown into the crater, would not fill it more than one-fifth full. If this was the crater of a volcano, where, then is the lava that came out of that part already empty? In the case of a volcano on the earth, we know that the material thrown out is thousands of times more than the hollow of the crater in sight. In fact there is

Fig. 31.—Grand Canyon of the Colorado, from Bright Angel Hotel. A railroad now runs to the Canyon from Williams, on the Santa Fe Railway, and improved hotel accommodations are being furnished by the railroad company.

such a vast difference that we never think of making a comparison. On the contrary, if you are on a train crossing the bridge spanning the great Canyon Diablo, in New Mexico, even children will wonder where the dirt is that came out of it. It is in the same direction that the material is, which once occupied the crater of Copernicus; driven down and packed underneath the asteroid that fell there. A part of this was pushed up to form the ring wall, and by close observation we can tell at what angle the asteroids struck the moon, by the shape of the ring it pushed up and the direction taken by the ribs or rays called rilles, which run out from it and should convince us of the nature of its origin. These rilles are certainly plain enough evidence, that they were raised from beneath by pressure of the falling asteroids. If any reader doubt this, let him throw a good sized rock into stiff mud and note the result. There will be a ring around the hole the rock makes; the rock will be seen

sticking in the center of the hole below the surface; there will be rilles or rays, radiating from the hole and inclined to be parallel with the direction taken by the rock. Then let him take a good photograph of the crater Copernicus or almost any ring mountain of the moon and note the exact resemblance. Of course there are real craters as there are also real mountains on the moon, caused by contraction in cooling. Dr. M. Willhelm Meyer in his "End of the World" on page 126 says:

> The force which always draws heavenly bodies closer together will in the end cause the moons to drop upon their planets and these again upon their respective suns. The moons will first unite with the planets because the distance they have to cover is shorter. All the planets with the exception of the earth and Neptune, which is the farthest from the sun, have more than one moon if they have any at all. * * * Taking all things into consideration, one can scarcely doubt that the rings of Saturn represent the product of the disintegrating action of the gravitation of a number of the planet's moons. It has been demonstrated that these rings are composed of tiny separate particles, each having an independent movement of its own. The innermost of the rings is semi-transparent. This "gauze ring," as it is called, is probably made up partially of matter which originally belonged to the luminous outer rings but which lost part of their centrifugal force in collisions and are therefore now dropping in a spiral path upon Saturn as meteors of a special kind, which probably do not injure the planet any, since it is protected by a very dense atmosphere. It is quite possible that in course of time, the material of the entire ring will gradually unite with the planet without producing any kind of catastrophe.

The above is along the line of a procession of planets and was published in 1905. Dr. Meyer has the same idea of the rings of Saturn as those held by Wm. Plotts and published in Higher Science magazine March 1904.

XIV.

COMETS.

A comet is a small body of material which gathers too far out from the plane of the sun's equator to be attracted as the moon of a planet; so, having very little motion, it falls more nearly in a direct line to the sun. As it nears the sun it gains such an immense speed and approaches so near to the sun that it is thrown up into space again, by centrifugal force, gradually losing speed until it falls again. Comets are perhaps the most wierd, fascinating and mysterious of all celestial bodies; certainly to those who have but their eyes with which to investigate the wonders of space. There is nothing so startling as these sudden and formerly unheralded visitors, unless it is the short moment of a total eclipse, of the sun. Altho they are so light and gaseous as to have almost no influence of attraction, even upon the smallest visible asteroids, yet superstitious fears are always kindled among the ignorant, upon the arrival of a new comet or the return of an old one. In olden days they were looked upon by the people, as heralds of all kinds of dire calamities; and were always a harvest time for the priesthood. The Romans, however, had a beautiful belief that the great comet which followed the death of Julius Ceasar, was a heavenly chariot sent to convey his spirit to the gods. An old English writer says:

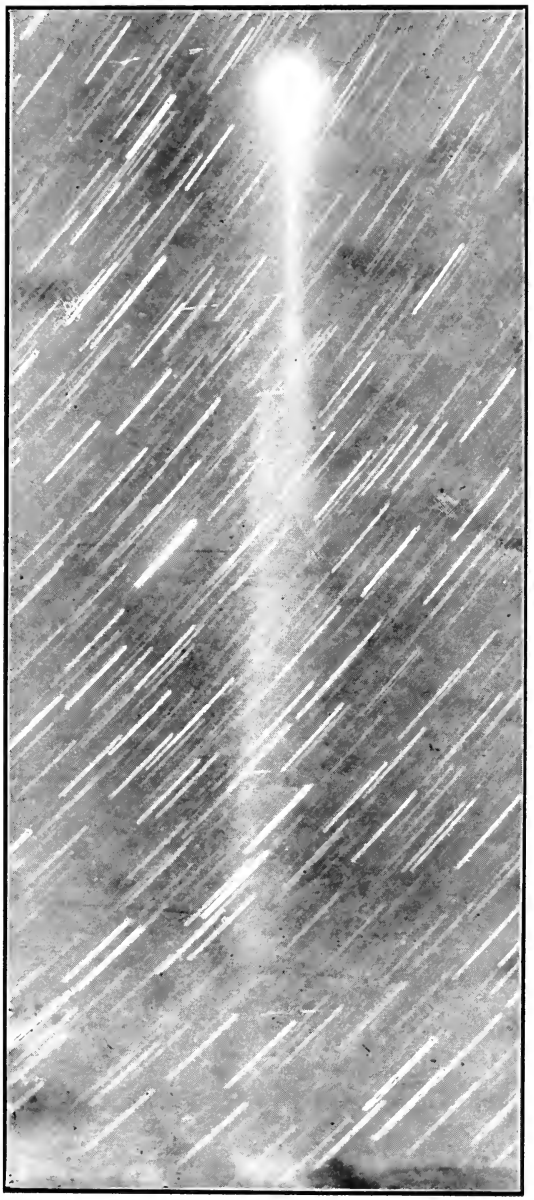


Fig. 32.—Shows the moving of the comet as compared to the stars.

Cometes signifie corruptions of the ayge. They are signs of earthquakes, warres, chaynging kyngdoms, great dearthe of corn, yea, a common death of man and beastie. Experiance is an eminent evidence, that a comete, like a sword, portendeth warre; and a harry or a comete with a beard denoteth the death of kyngs.

It is this appendix of hair and beard of comets now known as tails that I wish to discuss in the light of science and more especially in the light of the new theory of a procession of planets. You will remember it has been shown how the gas of expanded matter leaves or is forced by expansion up from the sun, by the swift disintegration of matter into gas. This outward force of expanding gas or heat radiation at or near the sun, is evinced by the corona of a total eclipse. It is even measurable at the earth, but continually slower as it leaves the sun, as there is more space to fill with gas in each succeeding orbit of the same width. Now let us examine the motion which a light body like a comet would recieve from this outward or upward motion from the sun. First a comet is always traveling at enormous speed before it reaches the vicinity of this fiery gas which throws a fiery shadow away from the sun, the outer end of which (shadow) must travel thousands of times faster than the comet itself because the outer end of the tail is describing a circle in some cases millions of miles greater than the comet's nucleus. The comet itself travels sometimes with almost the speed of light; therefore we cannot wonder that the end of the tail which must travel thru thousands of times more space, should be bent backwards in the shape of a sword. The closer a comet comes to the sun, therefore, the greater must be the illumination because the greater is the speed of both the comet and the outgoing gas which are

thus meeting at increasing speeds, making the shadowy tail of light, still longer and more curved.

Charles Heintz, of San Pedro, Calif., in his "Commonsense Theory of the Universe," gives the best explanation of the reason why a comet's tail is always pointing from the sun, that I have ever seen. He says on page 12:

* * * The secret of this rests in the fact that the light of the sun being so much lighter than the fire, the sparks and firelight lying under the greater light of the sun, cannot be seen by us if such fire is removed. In the same manner and for the same reason, only the sparks lying in the shadow of the comet's nuclei are seen.

What solid matter there is in a comet's wake, continues in the orbit of the nucleus or head, but without illumination; and, being so small and lighter than the nucleus, falls farther and farther behind, finally becoming meteoric matter to fall on other celestial bodies as meteors.

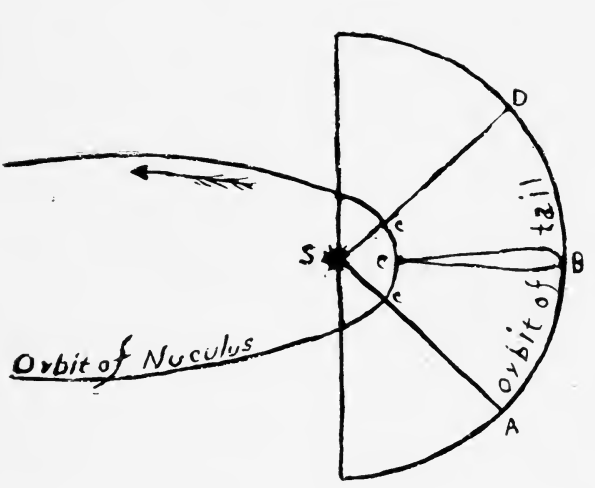


Fig. 33.—Comet's tail.

It is generally supposed by astronomers that some comets are not permanent members of our solar system. This error is due to calculating the partial orbit of a comet at its perihelion or nearest curve around the sun, where its speed is the greatest in its entire orbit, making centrifugal force so strong that it leaves the sun before it can finish the perihelion curve of an ellipse. The following is a quotation from Gillett and Rolf's Astronomy, page 291:

> * * * Since an ellipse is a closed curve, all comets that move in ellipses, no matter how eccentric, are permanent members of the solar system and will return to the sun at intervals of greater or less length, according to the size of the ellipse and the rate of the comet's motion. Parabola and hyperbola curves, being open curves, comets that move in either of these curves are only temporary members of our solar system. After passing the sun, they move off into space never to return, unless deflected hither by the action of some heavenly body they pass on their journey.

Of course this looks reasonable enough and the mathematical calculation would confirm it, if it were not for the fact that a comet continually looses its speed as it is thrown up from the sun by the immense centrifugal force that was generated in its fall. It was the centrifugal force caused by the immense speed it gained in falling that forced it to make a parabola or hyperbola curve and these forced curves could only last until the speed slackened enough to weaken the centrifugal farce, when it must come back to the curve of an ellipse. The fact that its dropping down towards the sun, gives it the great speed with which it passes partially around the sun in its perihelion, is sufficient proof that it must loose its speed and therefore, centrifugal force again, as this speed throws

it up from the sun. Not only is this proved by analogy, but by measuring the increase of speed as it falls toward the sun and the same ratio of decreasing speed as it is thrown up again by this acceleration of speed. By comparing the rate of speed when leaving the sun, with,say 100,000,000 miles from the sun, any good mathematical astronomer should be able to determine accurately how far it must travel before coming to a standstill, or making the same short curve which it made at the sun. At its aphelion it has almost lost its centrifugal force, because it has lost its speed; but it has not and never can lose its orbital motion, therefore must close its orbit at its outer or

Fig. 34.—The great nebulæ in Orion which is the the nucleus of the next world which will follow Neptune to the Sun.

upper end with the same curve it made at the sun, but, in immensely longer time. What its great speed forced it to do at the sun, by centrifugal force, its lack of speed forces it to do at the far away aphelion curve. It is a self evident fact that if a comet is at comparative rest in far away space it will gradually move towards the nearest sun of greatest attraction, slowly at first but gradually

faster and faster, until it reaches the greatest speed at perihelion. The farther it fell, the greater its speed; and the greater its speed the more open the perihelion curve, because of its greater centrifugal force and it is thrown off at such an obtuse angle that it could never enclose an orbit if the same speed were kept up. This speed however, not being kept up, it gradually loses its centrifugal force as it loses its speed, and comes gradually back to its original orbit and must make the same curve which it made at the sun.

We can watch and measure the increasing and decreasing speed of any celestial body which travels in an elliptical orbit, such as our own orbit around the sun, the orbit of our satellite around the earth or of the planet Mercury. These increase their speed as they approach their perihelion and decrease as they rise again towards their aphelion as I have shown you in the figure.

The reason we cannot watch a comet close its orbit at aphelion, is because its slow speed at that end makes no illumination and the body itself is so small and at such a great distance, that no telescope is able to reveal it. The idea that any celestial body which is once attracted to make an orbit around the sun, could thereby gain speed sufficient to throw it higher than the attraction of the sun. into the region of the attraction of some other sun, is as ridiculous and unscientific as to attempt to lift oneself over the fence by the bootstraps and is a mathematical impossibility. Astronomical curves of orbits take care of themselves on lines of least resistance, (which will soon be admitted), by generating and losing centrifugal force.

When once a body forms from expanded gas of matter

from the sun, it can never gain speed enough to get away from the sun and the more eccentric its orbit, the more it is retarded by its forced curve at perihelion. This is fully illustrated and proved by the action of both Fay's and Encke's comets. There can be no possibility of any matter which comes from the sun, ever leaving the influence of the sun's gravity. It may fall back around the

Fig. 35.—Port Los Angeles, three miles from Santa Monica, and about twenty miles from Los Angeles, showing the longest wharf in the world, about a mile in length, to deep water. Showing rising coast.

sun with almost the speed of lightning and yet as soon as it leaves the vicinity of the sun, or is thrown up again by centrifugal force, the attraction of that great central body is pulling and trying to draw it back and back it must come sooner or later, while each returning trip must be made in less time and shorter orbits.

Since it has been proved beyond doubt that some of the comets (notably Encke's and Fay's), our own moon, the rings of Saturn and the planet Mercury are actually

shortening their orbits, a great deal has been said about "the resisting medium." The truth seems to have been gradually dawning upon real astronomers, that celestial bodies do not forever follow the same path; and they, therefore, are looking for a "resisting medium" with which to check the advance of these bodies, so they may travel more slowly and be allowed to fall to the center of their orbits. They will however never find a body in space traveling more slowly as it falls, because falling always increases the speed and it would be impossible for it to do otherwise. It is only when a comet or other body is receding from the sun in an eliptic orbit that it decreases its speed. When Newton discovered the force of gravity, he discovered the resisting medium which shortens the orbit of every celestial body, from the size of an atom of crystallized dust to the sun which would fill our solar system with its immense bulk. Gravity is a drawing or contracting power which holds or draws a body back towards the center from which it came and it should not take much of a philosopher to understand what medium of resistance shortens an orbit, now that they have found that orbits do shorten. With this immense power of gravity pulling against the earth, trying to pull it to the sun, what equally great power could push or keep it away from the sun? It is claimed that the speed of a celestial body keeps it away by overcoming the force of gravity. On the face of it this is a fallacy; for then, what great power could keep up its speed? There must needs be a constant power applied to overcome a constant pulling power towards the sun. Not only does a "resisting medium" fail to resist and check

its speed but constantly increases this speed the nearer a planet comes to the sun, or the nearer a moon comes to a planet. It could not have this speed and constantly increase it, except by falling; the power that gives every celestial body its ever increasing speed as it nears its center. Astronomers not understanding this, have been in the habit of speaking and thinking of the speed of a celestial body as being imparted to it by some unknown first cause, giving it a mighty push or throw into space, and they have let it go at that. Now, if they will drop this idea of a first great energy which, if unrenewed, must diminish, and see that this energy is caused simply by falling they will see that it is self-creative and self-operating.

The energy of falling has operated stronger on Mercury than upon Neptune, because it has acted longer; thus causing Mercury to be traveling ten times faster than Neptune. Thus we see it is really reduced to a question of weight. We also see that whatever power or energy was required to expand matter to the height of Neptune's orbit, will be reproduced when it returns to the sun.

XV.

MATHEMATICAL PROOF OF A PROCESSION.

There is a strange sequence or ratio between the speed with which the planets travel and their distance from the sun which is absolute proof of their continual falling to the sun. I have already given the table of ratio, which is Bode's law and is the table by which the missing asteroids were discovered. Commencing at Mercury we approximately double the distance to reach the next planet and so on; each one about twice as far away as the last. Why should the planets be arranged in this perfect ratio thru space, if there is not a good reason for it? Of course it does not happen by chance, because there is no chance and changing mind in nature to interfere with the law of their arrangements. They simply follow the line of least resistance back to the sun. Commencing at Neptune and coming in towards the sun, we find the same ratio in the increase of their speed along their orbits that we have in their distance from the sun; and little Mercury is traveling ten times as fast as slowfooted Neptune, which, while almost one hundred times as far away as Mercury, has comparatively only begun to fall.

Let us compare the speed and distance of these planets that we may be prepared to make a law, or rather to understand the simple law which they follow, have always followed and must follow forever. The table below

shows the distance of each planet from the sun and its speed along its orbit.

Planet	Miles per day	Distance to Sun
Mercury	2,454,500	36,000,000
Venus	1,860,000	67,000,000
Earth	1,260,000	93,000,000
Mars	1,100,000	141,000,000
Asteroids	811,000	240,000,000
Jupiter	660,000	483,000,000
Saturn	490,000	885,000,000
Uranus	350,000	1,770,000,000
Neptune	274,000	2,800,000,000

With the above table for a basis, does not the greater speed of the nearer planets to the sun, prove that they have been farther away some time in the past? Take Mercury for example, which moves at the rate of two and a half millions miles per day. This must prove one of two things; it was not thrown out from the sun as a mass, in which case it would only move at the rate of the sun's equator, or else it was much farther away and has gained its great speed by falling towards the sun.

At the slow rate of speed at which Neptune travels, there is very little centrifugal force against it, and it drops towards the sun 1,500,000,000 miles in 400,000,000 years, while Mercury moving at such enormous speed, only nears the sun 16,000,000 miles during the same time, because the checking power of centrifugal force is so much greater. To be sure the force of gravity is also much greater at Mercury than at Neptune but centrifugal force is not equal to the force of gravity, as was supposed

by Newton. While Neptune is coming in towards the sun 1,500,000,000 miles, Uranus only comes in half as far, because its speed is doubled; thus adding centrifugal force and checking its approach to the sun that much. Therefore we find them shortening their orbits and increasing their speed as they approach the sun.

As a planet moves around the sun in an ellipse, it travels faster when on that part of its orbit, where it is approaching the sun, and more slowly where receeding as we have already seen. Comets are an excellent example of this law. As they drop towards the sun in a more nearly straight line than any other body they gain speed more rapidly as they fall and also lose their speed more rapidly when thrown up again by the enormous centrifugal force. Comets are governed by the same laws that govern planets, but upon an exaggerated scale, which offers us the opportunity to measure the exact difference between the force of gravity and centrifugal force. In the case of Encke's comet, this shortening of its orbit measured in time, is about three hours in an orbit of three years. If a planet is one million miles nearer the sun, than formerly, it has fallen that far altho it may have taken ages of circling in a great decreasing or spiral orbit and it has gained speed in accordance with the laws of falling bodies minus the check it receives from centrifugal force.

Considering all the facts now before us, we find the law governing their speed and distance from the sun is perfectly plain; so plain, in fact, that if one is missing we can find its scattered remains with a camera, where the law would place it. The law then, is this:

The planets increase their speed along their orbits by

falling towards the sun, in the same inverse ratio with which they decrease the diameter of their orbits.

Commencing at Mercury with our ratio of distance we could go on doubling the distance according to Bode's ratio 12 more times out from Neptune's orbit and yet be within the sun's influence of gravity, halfway to Alpha Centura.

We know the weight of both Neptune and the sun and their distance from each other; therefore we know the value of attraction of gravity between them. By finding the relative value of centrifugal force and the force of gravity, by means of comets, we can soon be able to establish the age of planets and satellites.

Fig. 36.

XVI.

THE CRUST OF THE EARTH.

Judging by the volcanoes which emit molten lava; by the increase of heat as holes are bored to great depths, and by the appearance of stratas of different ages; it is supposed that the earth has been a molten mass and has cooled to the depth of about fifty miles.

This is also surmised by the condition of other planets and bodies in space, which are of different ages and stages of heating or cooling.

I have referred to this in other chapters and am content to refer you to geologists who have made that subject a life study. Evolution is also a profitabe study, showing how life has developed since the surface of the earth commenced to cool on up thru the different stratas to the present time.

Outside of what I have already shown you of the probable cause of the glacial period, I have no objections to the general opinion of geologists and evolutionists, except upon the subject of oil and coal.

I have had many years experience and study upon these subjects and more especially on the subject of coal formations. Many years ago I began the study of coal formation on the Pacific Coast and discovered that the prevailing idea that coal was formed ages ago from vast deposites of timber and other bodies of buried vegetation, is an

error. It would be impossible for this to be the case, because it could not be buried in a body and be free enough from dirt and foreign matter to form coal, unless there was some agency to purify it after it was buried under drift. Studying and experimenting upon the subject, I found instead of being a finished product of remote ages, it is a continual process. Coal is still being deposited in the bottom of seas and lakes, the same as in former ages and is growing better and better continually.

The difference of the quality of the coal found wast of the Sierra Nevada range of mountains, with its extensions and the coal found east of this range as far as the summit of the Rocky Mountains, attracted my attention a number of years ago following a considerable experience with and study of coal, at Elsinore, San Diego County, California, and a careful analysis of that subject in connection with other substances, finally laid the foundation in my mind, out of which evolved the discovery of a Procession of Planets.

Beginning with the western Pacific coast or that portion west of the great Sierra Nevada range, thru North America and west of the Andes thru South America, we find the land has, comparatively, recently come up from the western ocean and is gradually rising; so much indeed that there are but few harbors south of the state of Washington, altho we find outlines of harbors, inland from the coast, oyster beds on the foothills, belts of petroleum and many other sure evidences of its recent submersion. In all this region we find basins of coal of a very inferior quality and of recent formation. Indeed it can scarcely be classed as coal except for the reason

Fig. 37.– Spiral Nebula in Canis Venatici.

that it is the raw material or mud from which coal is finally evolved. The coals at Elsinore, Tuscon, Mt. Diablo, Tessler and other points along the coast west of the Sierras are of the same recent formation, readily decomposing when exposed to the air, and sufficiently charged with oil and gas to cause spontaneous combustion while still in the mines if the airways are not properly laid out, so as to counteract instead of augment the generation of electricity—which is heat.

The chemical analysis of these coals average about as follows: Moisture 13.55; fixed carbon, 26.65; volatile gases, 36.50; sulphur, 4.05; ash, 19.25. The sand in which they occur, shows a very recent formation when compared with the old sandstones of the Mojave desert, east of the Sierras. Their shales are so highly charged with petroleum that they are easily lighted when held to a lighted match. The roofs and floors scarcely take the dignity of age due even to fire clays, much less soapstone or slate, and are still more or less mixed up and impure. In this region of recent sumbersion, we find many belts of petroleum, for which we must always look in most recent formations inasmuch as it is perhaps, the most temporary and easily set free of any mineral in nature. Being lighter than water and easily converted into gas, it is always being driven from place to place under pressure and ready to escape at the first opportunity offered by a volcanic or earthquake crack. It is scarcely ever found in old formations which have stood the change of ages.

Going east of the Sierras, across the great interior basin, to the summit of the Rocky Mountain range, we find a much older formation of sandstone, with a much older and purer coal formation. No oil or soft coal of the western coast is found, save in certain basins of recent inland seas. The coal is of a bright, pure quality of Lignite, such as is found at Gallup, New Mexico; Randsburg, California; Yellowstone Park, Wyoming; parts of Utah, Colorado, Nevada and other states and territories of the Great Basin. All these coals show about the same age, purity and general quality; and must have been raised from the sea at nearly the same time;

Fig. 38.

perhaps cut off by the Sierra Nevada range, and the lower basins remaining inland seas for ages, as the Great Salt Lake still testifies. The average analysis of these coals is as follows: Moisture, 8.25; volatile gases, 35.32;

fixed carbon, 45.37; sulphur, 2.06; ash, 9.00. This is the analysis of the coal in the large veins recently found at Randsburg, California.

The great difference in purity and quality of the two kinds of coal, shows us that during the millions of years since the latter came out of the sea, some powerful agent has been at work purifying it; drawing it together and abstracting those materials which are not carbon, but which are now found in layers above and below it. But, it is still far from being the best of coal; and when we go now to the basin known as the Mississippi valley, between the Rocky and Allegheny ranges, we find a formation still more pure and condensed, than the Lignite coal west of the Rockies, showing that the process of separation and purification has been going on for millions of years and still goes on.

Still farther east, beyond the summit of the Alleghenies we find anthracite coal; the oldest and purest perhaps, that nature can produce. Its clay and soapstones are hard and its sandstones so ancient that they can hardly be told from the metamorphic rock. Here it is again sinking into the sea, not for the first time perhaps, for who can tell how many times nature takes matter around the same cycles on a plane, in the course of a hundred million years.

After a molten planet commences to cool and form a crust, according to the Processional Theory, there is a force at work separating matter into its elements. This force—which for the sake of argument, I have called gravity—is crystallization, polarization, or that force or attraction which always attracts "like to like." It is

not impossible that magnetic attraction has a great influence in this purification of coal and other elements of matter, nor at all improbable when we bring to mind the wonderful experiments of Prof. Elmer Gates, who showed that electricity is actually a common carrier of material (see Everybody's Magazine, May, 1901). We need not be surprised if that ever active, ever present agent is not also largely responsible for the well known attraction of "like to like." Whatever the assistant force may be which helps to do the work of purification, we have here in these four great divisions of coal of successive ages, the unmistakable evidence of its perfect work. First we see the muddy beds of soft newly formed valueless coal, just raised from the western sea; second the lignites of the Great Basin; third, the bituminous coal of the Mississippi valley, and, fourth, the Anthracite coal of the eastern coast; each one purer, better, older and harder than the one following. Will any philosopher or scientist have the hardihood to believe that anthracite coal was always as pure from foreign matter as it is now, or that the western coast "dirty coal" will never become pure? We cannot even imagine a deposit of any material that would make coal in a sufficiently pure state to be anthracite. Even Prof. Vail's "Annular Theory" of falling carbon could not provide for the sinking of carbon to the bottom of seas, unless it was mixed with heavier material, at first. A growth of timber 100 feet thick could not be covered with drift without being penetrated in every part by sand and dirt; the soil it grew in, would be mixed thru it and its rotten logs and leaves would be more ash than carbon. Such a

supposition would not be tenable even in the case of pure asphaltum or peat, the specific gravity of which would not permit it to settle on the bottom of seas where strata must first form from vegetable matter. The coal beds which are forever forming in the basins of the seas and lakes are composed of any kind of vegetation, leaves, and fortified by the growths it generates in the sea, and the graveyards of marine life. At first these beds containing

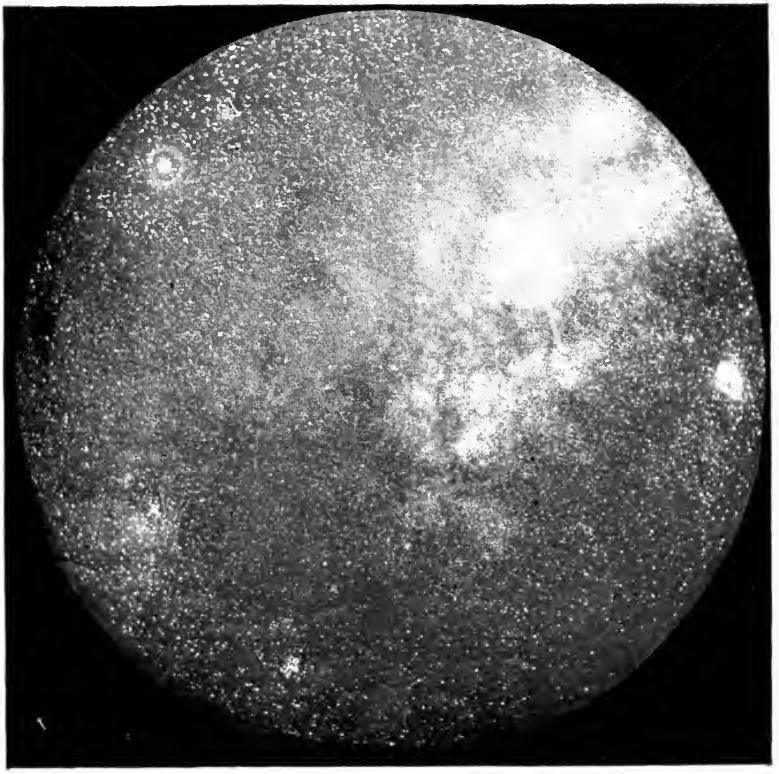


Fig. 39.—View in the Milky Way.

carbon must be attracted to the richest point by the processes with which gravity (?) does its work, drawing the carbon closer together, drawing out the clays, in layers or veins by themselves and leaving the sands to form sandstone in layers. The oil is also drawn into a separated condition, distilled, no doubt, by the heat pressure as illustrated by Wm. Plotts, in his book, "The Formation of Coal and Petroleum."

In order to convince us that these coal veins are drawn together and purified from beds of mud, is it not enough to examine these four coal divisions of the United States, the ages of their formation and their degrees of purity? We know that other substances contained in bodies of drift, are always changing and gathering into seams. The most noticeable of these, perhaps, is lime which, as spars of different kinds we find being drawn into little seams even in very recent drift; and this being the case, why not the same with coal? This certainly holds good in the case of all elements which have been mixed by water in the formation drift. In very recent drifts I have noted little seams of lime forming; all the lime on both sides of the seams for many feet being drawn into the seams. To prove that it is doing so, it is only necessary to follow a seam down and observe that it grows wider and wider as the drift below grows older and older. I mention lime as an example because it is usually more plentiful in drift and seems to be the first element to respond to the attracting force and show this chemical action. In the case of coal, the stratas lay horizontal to the curvature of the earth—attracting from above and below at the strata where the mud is richest in car-

bon—and gradually abstract all the carbon within ten or twenty feet above and below. Next to the coal, the silica gathers, forming clays; the sand thus being left to itself, becomes almost pure sandstone. There is also almost always iron in some form; this usually gathers together in some strata of the sandstone in the form of sulphides of iron from which is made sulphuric acid. In this western country, this strata of iron—when not rich enough to make a solid strata—is usually made up of balls of iron crystals of all sizes, round in form and sometimes crowding each other so much as to cause indentures in the later formations by those that formed first. These are called by miners sulphur balls; and are exceedingly hard annoying miners and drillers of oil wells by breaking drills and well tools. They are so hard that, when exposed by erosion of wash, they often stand for centuries protecting the sandstone directly beneath them from the rain till they appear like huge mushrooms. One example of this is seen in the Heald coal field near Randsburg. It is some twenty feet high, the sulphur ball at the top eight feet in diameter, the column itself gradually tapering from the sulphur ball at the top to a much larger diameter near the ground where it has been exposed a shorter time. There are dozens of these "stone trees" or "mushrooms" in this coal district; they are of all sizes and millions of them have often fallen in great piles. Since discovering the coal fields near Randsburg in 1895, I have found other absolute proof of this motion of matter which attracts like to like. In November, 1903, I had occasion to visit the coal mines in company with an agent identified with steel and coal interests. While

Fig. 40.

waiting at the little station of Kramer, on the Mojave desert, we had the pleasure of meeting an old friend of mine who had his hands and pockets full of what he termed "petrified yucca" which he had just gathered, and would, he informed us, "burn like coal," and which we found to be the case. Now it is a well-known fact that ordinary dead yucca wood, altho very light, will extinguish the best fire that desert fuel will make; so we were of course greatly interested. Upon examination, we found this new fuel to be actually, coal. The yucca, being carbon, had acted as a center, drawn upon the soil for carbon, and become filled with coal. Investigating further, we found the best of it had been partially buried in the soil; but, in many cases we found dead yucca trees thirty to forty feet high, carbonized as high as four feet from the ground. This phenomenon of coal forming under our eyes, from carbon in the soil, is positive proof that coal purifies itself from mud, carrying vegetation or carbon in any shape, drawing and purifying itself from deposits of mud, and that it will always do so, as long as rain falls upon the earth, carrying vegetable deposits of carbon into the seas or lakes.

There are certain conditions under which anthracite may and does exist in the Great Basin, between the Sierra Nevada and Rocky mountain ranges. Prof. Bailey of the California State Geological force, informs me of several such occurrences observed by himself; one in Mexico, one in Wyoming and one near Gallup in New Mexico. He is of the opinion that the same will be the case with the coal in the Randsburg mines, as the lower vein there indicates by breaking in curves like glass.

These anthracites are not caused by age, but by conditions of heat which have existed where volcanoes have come up thru the coal formations as is the case at the Randsburg mines. That the mountains of the earth are sometimes raising, is demonstrated by the fact that stratas of comparatively recent sandstones—which of course laid level while forming—are raised to great heights on mountain sides sometimes pitching almost 45 degrees. While prospecting for coal I have found two notable instances of this; one at the northwest end of the Elsinore mountain range in Orange County, California, the other on the northwest slope of the Golar mountains in Kern County, California.

Altho the erosion is great, it does not keep pace with these wrinkles formed by a cooling planet.

Prof. Oscar P. Heinzeil of California declares that throughout the eastern sections of the United States the recent eruptions of Mt. Pelee have caused noticeable elevations. He claims to have discovered places along the sea coast and in the interior where the ground has risen from three to ten feet. Prof. Heinzel says that along the Atlantic coast it is noticeable that the tide does not reach the height it formerly did by from four to ten feet and that as far inland as Harrisburg, Penn., elevations of four feet have been noted.—Times.

If the above is finally confirmed, it is a matter of more interest and importance than seen at first sight. The entire Atlantic coast has been gradually settling into the sea for ages; as shown by its many excellent harbors, while at the same time the Pacific coast has been rising as shown by its lack of harbors. Records kept since the founding of St. Augustine, Florida, show a recorded settling of eight inches during each century. This has no doubt been the result of the weight of water

caused by the revolution of the earth from west to east backing it up against the eastern coasts and relieving the western coasts of the same amount of weight. At the isthmus of Panama where it was possible for the government to make an accurate survey, on account of the short distance between the two great oceans, the difference in water levels is 38 feet. To substantiate this theory of the weight of water being the cause of the gradual sinking of eastern coasts and rising of western coasts we must remember that the earth revolves on its axis at the rate of 1000 miles per hour at the equator, where the water would therefore be backed up the highest on an eastern coast and receded the most on a western coast; the difference growing gradually less as we go farther north or south towards the poles, where the earth has little or no axial motion and therefore little or no difference of weight of water on its eastern and western coasts. For this reason we should find eastern coasts at or near the equator settling faster and western coasts rising faster than those farther north or south; and this condition seems to be the case where coasts are running reasonably near north and south. Perhaps if Prof. Heintzel's observations prove to be correct they may be only local; inasmuch as it would take a greater disturbance than the Mt. Pelee eruption to suddenly raise the entire Atlantic coast, contrary to natural forces by means of which it must steadily incline to sink.

The terrible volcanic disasters in the British West Indies in 1902 whereby tens of thousands of human beings were swept suddenly out of existence, has called

forth many conflicting opinions from scientists as to the probable cause. The most general opinion seems to be that it was an explosion caused by water flowing from the sea into subterranean caverns, where it was expanded into steam under such tremendous pressure that it could no longer be held in bounds; therefore seeking the highest point in the vicinity for release. Does it not seem rather that it would seek the weakest point, the

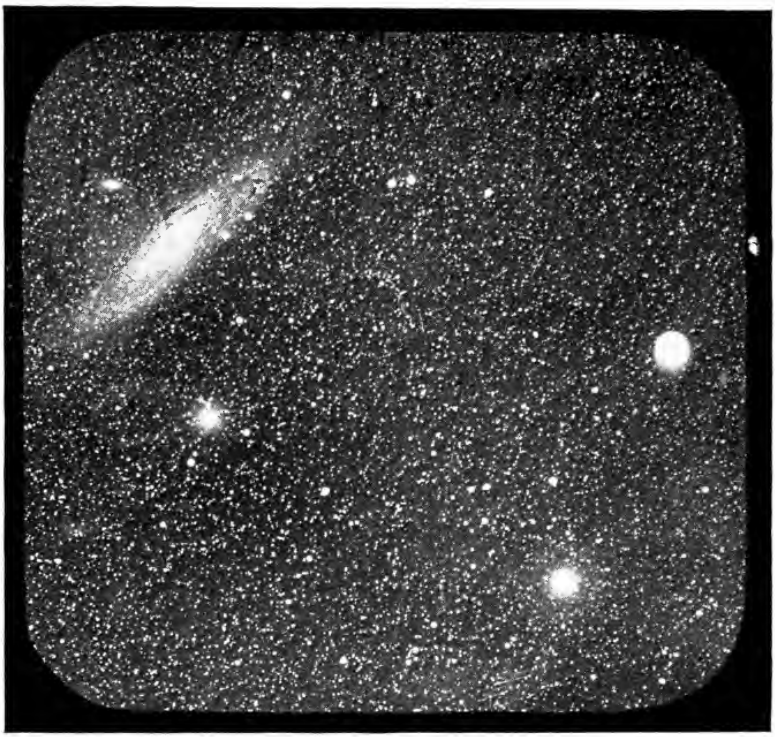


Fig. 41.

crevices, for instance, thru which the water gained access? The fact that the trouble was not local, but that the disturbance took effect at the same time hundreds of miles distant, would indicate a general disturbance of the molten matter under a large section of the earth's crust; thus being only one of the perfectly natural and necessary occurrences peculiar to the crust of a cooling planet. This contraction naturally forces the molten matter out thru volcanoes which seem to be the original ventholes left when the crust first formed; and which have built themselves and the country around them up higher and higher during each successive eruption. Hon. Austin Young of Randsburg, California, who is a deep analytical thinker, says in Higher Science of November, 1902:

* * * The theory of ocean water running into molten lava or into hot cavities of volcanoes and causing them to explode, as advanced by scientists generally, seems to me to be absurd. In the first place, the natural gravitation of mud, sand and other debris in the sea, with the weight of water above, would fill up all such crevices. In the second place if there were fresh cracks from below, then the action of the volcano must have started before the water got in at all. Even if there was a crevice and the water rushed in suddenly, there would be but a small explosion about like a dynamite mine, as the explosion must come at once when the water first touched the molten matter. In the compact state of the earth we can see that there is no chance for any large body of water to come suddenly in contact with a great body of molten matter, as you can see by throwing a bucket of water into a caldron of melted iron. If there is such a thing as a molten inside to the earth, the water would be instantly driven away from it by heat and it would be comparatively cool before the water could come in actual contact, except in cases where the molten lava overflowed from volcanoes and ran into it.

Of all the guesses I have seen, attempting to account

for earthquakes, there has not been much that is really instructive, or to the point. Most of the scientists have agreed that the earth is cooling from a molten state and that the buckling of the surface and raising of mountains is the cause of them. This is evidently not the case, because mountains raise very slowly and gradually and no one could possibly perceive such a gradual motion. There are no doubt two kinds of earthquakes, both of which I have observed hundreds of times on the Pacific coast and they are both due to violent electrical disturbances; one in the atmosphere entirely and the other in the earth. The most common earthquake which I have observed is a product of desert countries and happens during what is called "earthquake weather." I have heretofore explained that heat and electricity, in fact, all forces are the same with the exception of faster or slower vibrations of force. There is a point between heat and electricity where heat cooling changes to electricity, and this may take place as heat radiates from the earth's center toward the surface where great bodies become overcharged and later discharge into the atmosphere or clouds which are overcharged with the opposite polarity.

Cooling is a process of gravity and magnetism is a result or part of cooling and must be taken into consideration for the action of magnets and magnetic needles. Considering these facts then in connection with the violent shaking of the earth, we may be sure that there is some connection, by the balancing of the positive and negative electricity contained in the earth and the atmosphere. I have often seen the tops of hills

nearest the clouds blown out during storms when the electricity evidently discharged from the earth into the clouds. Usually the clouds are overcharged and discharge into the earth; but this is not always the case.

I am investigating this subject and collecting data which Iwill furnish to readers of my magazine, "Higher Science," from time to time. One of the strange things I have lately discovered is that eggs that are almost ready to hatch are killed by earthquakes, or by very heavy thunder showers. This is evidently not caused by the shaking, but by the electrical charge.

Fig. 42.—Giant Sequoias, near Mariposa Few travelers in California neglect to visit the celebrated big trees, of which there are several groups, some of them old monarchs of the forest, reaching a height of nearly 400 feet.

XVII.

WHAT GREAT MEN HAVE SAID.

Supporting the new and wonderful theory of a procession of planets, many astronomers, physicists and philosophers have given their discovered evidence of its truth; some of them as a sort of prophesy long in advance of its discovery in 1899. Scientists of today will be astonished at this testimony when they find it grouped together and will hardly have the hardihood to deny it, after having read the testimony which fits so perfectly into every part of the discovery of a procession of these celestial bodies toward the center of their convergency.

In his "Terrestial Magnetism," Prof. Procter says:

> Interesting as are the bonds of union which Copernicus, Kepler and Newton have traced in the relations of our solar system, it would seem as tho we were approaching the traces of a yet more wonderful law of association.

Speaking as a real prophet, Prof. Agasis, the great American scientist, once said:

> * When the Unitary Science comes it will be something so entirely aside from our fixed habit of thought, that it will find its first appreciation, probably, among men of large general culture, rather than among men who are specialists in science.
>
> *(Which is this Processional Theory of the true motions of matter.)

It is a noticable fact that the Processional Theory, which has now been discovered and published for six

years, has never been accepted by a single scientific institution, altho thousands of liberal free thinkers and people not tied to text-books by diplomas, perfectly understand and endorse it. The principal reason why specialists do not endorse it is fully explained in the preface of this book. It is because they have received the most of their information from textbooks and their present associations being with societies and schools,

Fig. 43.—Cliff dwellings at Walnut Canyon, Arizona, nine miles southeast from Flagstaff. They occupy a level, high up on either side of a narrow gorge. Relics of the early inhabitants are often found in these caves.

they do not care to oppose them for fear of losing prestige, influence or diplomas. This is a deplorable condition for which there seems to be no remedy except time and new generations. People are like sheep who follow a bell. Associations and societies may be likened to crystallization of matter, because they crystallize ideas until they are fixed or dead and from which it is then hard for even a thinking scientist to break loose.

Referring to the disposition of the sun's radiation of energy and matter, which is the foundation of the new theory or discovery of a procession of planets, Sir Wm. Hershell, the great English astronomer, thinking that light was matter, once said:

It is probable, nebulae form the material out of which nature elaborates suns and systems and that in virtue of a central gravitation each particle of nebulous matter becomes more and more condensed and assumes a rounder form; it acquires gradually a rotary motion and the condensation goes on increasing, until the mass acquires consistency and solidity and all the other qualities of a comet or planet; that by a still further process of condensation the body becomes a real star and that thus the waste of celestial bodies by the perpetual diffussion of their light, (he should have said gas or expanded matter), is continually compensated and restored by new formations of such bodies, to replenish forever the universe with planets and suns. (Phil. Trans. 1811).

Prof. John Tyndal, the late English philosopher and scientist, in his work "Heat As a Mode of Motion," page 449, says:

As surely as the weights of a clock run down to their lowest position, from which they can never rise again unless fresh energy is communicated from some source not yet exhausted, so surely must planet after planet creep in age by age towards the sun.

This shows that Prof. Tyndal realizes by reason and analogy that such a condition was inevitable; but the strange part of it is that he could believe this and not wonder or know what must be the result when they did come into the sun. He was not ignorant of the Mayer theory of the sun being fed by meteors, as he says in the same book, (page 57):

* * * Knowledge such as that you now possess, has caused philosophers in speculating on the mode in which the sun is nourished

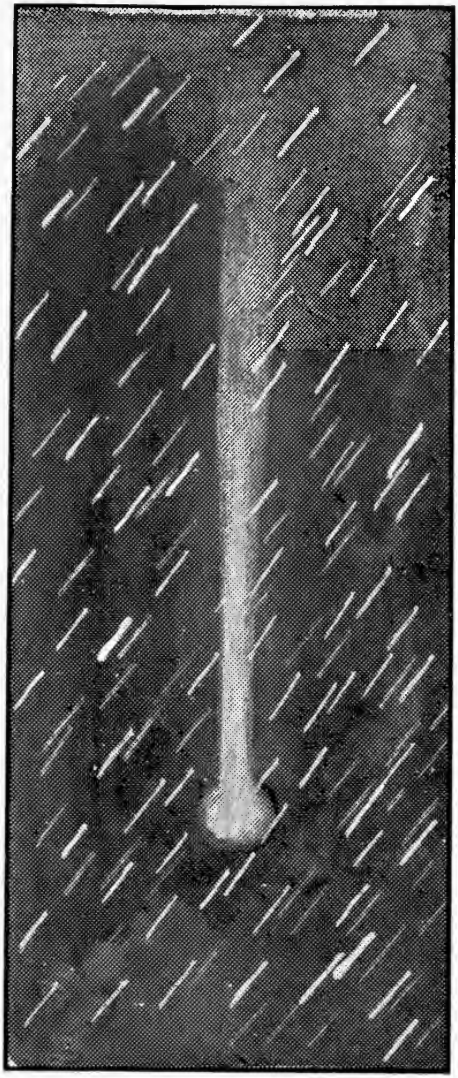


Fig. 44.

and his supply of light and heat kept up, to suppose the heat and light to be caused by the showering down of meteoric matter upon the sun's surface. Some philosophers suppose the Zodiacal Light to be a cloud of meteorites and from it it is imagined the showering meteor matter may be derived. Now, whatever the value of this speculation, it is to be borne in mind that the pouring down of meteoric matter in the way indicated, would be competent to produce the light and heat of the sun. With regard to the probable truth or fallacy of the theory, it is not necessary that I should offer an opinion. I would only say that the theory deals with a cause which if of sufficient operation would be competent to produce the effect ascribed to it.

Altho Prof. Tyndal did not see fit to put himself on record as endorsing the theory he was careful not to discourage its investigation. Being opposed to the emission theory of light, believing it contained no substance and not realizing that the sun is expanding matter into gas of tens of thousands of times greater bulk, he, of course, saw no source from which to keep up the supply of falling matter; therefore hesitated to endorse it.

If he could have realized this he would at once have perceived the simplicity of the whole working scheme of the solar system and all nature which generates force by the expanding power of heat and the contracting power of cooling. This portion of the theory took such a permanent hold on his mind, however, that he again goes over the entire theory in detail—commencing on page 493 of the same work from which the following are extracts:

There is another theory which, bold as it may appear at first sight deserves our earnest attention. I have already referred to it as the meteoric theory of the sun's heat. Solar space is peopled with ponderous objects: Kepler's celebrated statement that there are more comets in the heavens than there are fishes in the sea, refers to the fact that a small portion only of the comets belonging to our solar

system are seen from the earth. But besides comets, planets and moons, there are a numerous class of bodies belonging to our solar system—asteroids, which from their smallness might be considered as cosmos atoms. Like the planets and comets, these smaller bodies obey the law of gravity and revolve in elliptic orbits around the sun; and it is they, when they come within the earth's atmosphere that, fired by friction, appear to us as meteors and falling stars. On a clear night twenty minutes rarely pass at any part of the earth's surface, without the appearance of at least one meteor. At certain times they appear in enormous numbers. During nine hours of observation in Boston, when they were described as falling as thick as snowflakes, 240,000 meteors were calculated to have been observed. The number falling in a single night upon the earth might have been estimated at hundreds of thousands of millions. And even these would constitute but a small portion of the total circulating around the sun. * * *

Though the larger bodies show, in historic times, no diminution of their periods of revolution, this may not hold good for the smaller bodies. In the time required of the earth from the sun, to alter a single yard, a small body may have approached thousands of miles nearer our central luminary. Following up these reflections we would infer that while this immeasurable stream of ponderable matter rolls unceasingly towards the sun, it must augment in density as it approaches its center of convergency and here the conjecture naturally arises that nebulous lights of vast dimensions which embraces the sun—the Zodiacal Light may owe its existence to these crowded meteoric masses. However this may be, it is at least proved that this luminous phenomena arises from matter which circulates in obedience to planetary laws; the entire mass constituting the Zodiacal Light must be constantly approaching and incessantly raining its substances down upon the sun.

His expressed idea that it must augment in density as it approaches its center the sun, sustains the Processional Theory that as a body nears the sun it increases its speed by falling, increasing centrifugal force, so that the diameter of its orbit would shorten more and more slowly, as its speed quickens. He goes on to show how all matter is made fuel in the sun and then he says:

* * * It matters not therefore, whether the substances be combustible or not; their being combustible would not add sensibly to the tremendous heat produced by their mechanical collision.

Here then we have an agency competent to restore his lost energy to the sun and to maintain a temperature at his surface which transcend all terrestrial combustion. * * * * He deals with the true causes. * * * I do not pledge myself to this theory, nor do I ask you to accept it as demonstrated; still it would be a great mistake to regard it as chimerical. It is a noble speculation; and, depend upon it, the true theory—if this or some form of it be not the true one—will not appear less wild or less astounding.

Prof. Ernst Haeckel, the great living German astronomer, says in his "Riddle of the Universe," page 243:

* * * Even our mother earth which was formed of part of the gyrating solar system, millions of ages ago, will grow cold and lifeless after the lapse of further millions and in gradually narrowing its orbit, will fall eventually into the sun.

Why then should he not know that in its fall it must restore heat to the sun and why does he not see that in so doing it must be changed into colorless gas, tens of thousands of times greater in bulk and be pushed up into the space beyond Neptune's orbit?

The following article is a great victory for the Processional Theory, altho it only admits the possibility that all space may be filled with the gas of expanded matter.

* * * It thus appears that the upper stratas, both of the sun and the earth consist of lighter constituents which are largely removed from the lower atmosphere by their lightness, and no limit can be placed upon the distance to which these elements would travel from the sun or earth into interplanetary space. What is true of the sun and earth, is doubtless true of other planets and other suns, and it seems not impossible that even interstellar space may contain these and similar gases, in an almost infinitely attenuated condition. What the

condition of these gases may be at the temperature of interstellar space, which cannot be far removed from absolute zero, it is difficult to say. On the one hand, at such a temperature, they might be expected to be solid; but on the other hand, the particles would be relatively so few and far apart from each other that they would have the properties of a gas. The great advance in our knowledge during the past few years gives promise of much new light in the near future. (Popular Science Monthly, February, 1903).

The last half of this article is mere speculation, with no facts for a basis, because if gas was in a solid condition and its solid atoms far apart, it would no longer be gas; but on the contrary would be crystal clouds, thru which light or heat could not travel to us from other suns. It is positively certain that light, heat, electricity, force or any other motion, cannot travel thru an absolute vacuum, which absolute zero would be, for the reason that where there is no matter there can be no motion and where there is absolute zero there can be matter.

Omar Khayyam, the renowned astronomer poet of Persia, who lived about 1000 years ago, says in his "Rubaiyat, or Life Poem:"

> The sages who have compassed sea and land,
> Their secret to search out and understand—
> My mind misgives me if they ever solved
> The scheme on which this Universe was planned.

David P. Todd, quoting Dr. See's ideas in his book "Stars and Telescopes," page 252, says:

> Applying the law of binary evolution to the planetary system, Dr. See concludes that the planets were not separated in the form of rings, as Laplace supposed, but in the form of lumps or masses which would easily condense into planets and satellites. In this manner he escapes the necessity of explaining how rings would condense into single

masses; indeed, he maintains that rings would not condense at all but become swarms of small bodies, like those that make up the rings of Saturn and the small planets between Mars and Jupiter.

The author then proceeded to endorse Dr. See's ideas as the most reasonable advanced (1902). Of course he may never have heard of or read the Processional Theory at that time, but the impossibilities of the Nebular Hypothesis were very apparent to both Dr. See and

Fig. 45 —Showing 3000 feet wash thru solid granite.

Prof. Todd, as they are also becoming to many of the leading thinkers. The ridiculous feature of the outside planets traveling faster than the ones nearer the sun, when they should be—as they are—traveling hundreds of times slower, is dawning upon the minds of all thinkers and forcing astronomers to revise their old worm-eaten text books. By and by the common thinker will force them to see the whole simple truth of a never-

ending procession of planets to centers or suns, where their electric energy is regenerated.

Chambers' Astronomy has the following sensible paragraph upon the subject of comets shortening their orbits. Vol. I., page 399:

> There is reason to believe that comets in general, for some unknown reason, decrease in splendor in each successive revolution.

In the light of facts shown in the Processional Theory, the "unknown cause" becomes perfectly simple and easily understood. Comets only burn themselves up, the lighter matter falling farther and farther back as they drop toward the sun, until the splendor wears out and the nucleus burns up; that is to say, expands into gas till there is not enough solid matter in any one place to make an illumination by falling.

Peabody's Elements of Astronomy, also, in speaking of comets, note 485, says:

> The periods of both Encke's and Fay's comets are diminishing; Encke's looses about one day in about eight revolutions. This indicates that some cause checks the forward or tangential force of these comets, leaving the radical force of the sun to draw them more swiftly about itsself. Encke supposed they were retarded by a resisting medium, or ether, which is most dense near the sun, but Fay's comet is delayed * more than Encke's altho its perihelion is much farther from the sun. Others suggest that comets meet meteoric stones and that Fay's as its orbit is farther from the sun, encounters most of these obstacles. Should the hinderance, whatever it may be, act long enough, they must finally disappear in the sun.

The fact is they shorten their orbits for the same reason and by the same law that planets do; but they are so small and have such eccentric orbits they actually

* (Its orbit is larger).

shorten them in a measurable degree in one or more orbits, often during the lifetime of a human being, thus giving us an exaggerated scale from which to figure. The reason why Fay's comet nears the sun faster than Encke's is because it is farther out, therefore moves more slowly and does not have so much centrifugal force to check its approach, which, as we have seen, is governed by exactly the same law that planets obey in their approach to the sun and that moons obey in their approach to their planets.

Prof. Whewell, in his Bridgewater Treatise, page 128, says of shortening orbits:

> The fact really is that changes are taking place in the motions of heavenly bodies which have gone on progressively from the first dawn of science. * * * the moon has been moving quicker from the time of the first recorded eclipses and is now in advance about four times her diameter, of where her own place would have been, if it had not been affected by this acceleration. * * * the obliquity of its ellipse is also in a state of diminution and is now almost two-fifths of a degree less than it was in the time of Aristotle.

Thus we have additional proof that the moon is increasing her speed and shortening her orbit, as all other celestial bodies must be doing and as has been amply proven in the preceding pages by hosts of harmonious statements, as well as by figures which "never lie." The same infallible law of falling increases her speed and brings her nearer to the earth, and all matter both in the solar system and universe moves by the same law of falling.

Prof. Edgar L. Larkin of Mt. Lowe Observatory, Pasadena, California, who has been familiar with the

theory of a procession of planets since its discovery, says:

* * * Altho the prophesy business is risky, the assertion is ventured here that the discoveries in science will be so great as to upset all our conceits. Some rockhewn foundation law is near, beside which all our present laws will be little by-laws.

Prof. Lowell, in his new book entitled "The Solar System," while speaking of the age of planets, says:

Mercury represents planetary decrepitude. (He might have included Venus.) Mars, on the other hand, represents planetary youth. Mars, unlike the earth, is almost all land. Water is scarce and its whole supply comes from its polar caps of snow. * * * We now know of relations so systematic and so singular, that we are sure some new law underlies them. It is rather pleasant than otherwise to have this new law baffle our first attempts at discovery. The only thing we are sure of is, a time is to come when each of the bodies composing the solar system shall turn an unchanging face in perpetuity to the sun; when each will have reached the end of its revolution and be set in the unchanging stare of death.

William J. Cowan says in the Philadelphia Journal:

Every planet has its day. Some are in the infant stage of existence; some, like the earth, are prepared to receive and support life and some have advanced to the stage of old age—their vitality gone, their beauty departed, their day of usefulness past; and they simply revolve in space as a reminder to the student that all matter in a material sense shall inevitably perish. Planets come into existence and in the course of time pass out of the sphere of usefulness and others take their place.

Dr. M. Wilhelm Meyer, in "The End of the World," published in 1905, speaking of moons falling to their planets, shows how astronomers are recently discovering the procession of planets. On page 127 he says very truly:

* * * The nearer the moon comes to the planet, the smaller its orbit and the faster the velocity of its revolution. * * *

Again, on page 132 of the same work, in speaking of the planets falling to the sun, he says:

The same interplay must take place between the sun and the planets. One after another the planets will have to unite with the sun. And whether a planet drops all at once, or whether it is first transformed into a ring and then falls piecemeal very gradually, the result will be essentially the same; in far-off future ages the sun's diminishing supply of life-giving heat will be replenished, in the one case, suddenly therewith causing the sun to flare up brightly as a new star; in the other, slowly in gradual additions.

I might collect and continue these comments and facts almost indefinitely; but the quotations given certainly make sufficient corroboration to convince any common thinker.

XVIII.

PROOFS OF A PROCESSION OF SOLID MATTER TO THE SUN.

The following reasons and facts, each and every one, prove that there is a procession of solid matter, in the solar system, always on its way to and falling into the sun.

The planets move. This shows that they are falling in an orbit around the sun. If they were not falling they could not move.

The mathematical ratio of the distance of the planets from the sun, shows that they are coming gradually down , gaining speed as they fall, which increases their centrifugal force and checks their approach, in a regular ratio.

The mathematical ratio of the speed with which the planets travel round the sun, shows that they are falling and that as they gain speed they also gain centrifugal force, which checks their approach in a regular ratio.

The moons obey the same laws in approaching their respective planets with the same mathematical precision that the planets obey in approaching the sun, both as to speed and distance, showing that it is a law which governs all solid matter having an orbit in space.

The orbits of Encke's comet, Fay's comet, Saturn's rings, the earth's moon and the planet Mercury, are ab-

solutely known to be shortening their orbits, which is proof that solid matter in the solar system is falling to the sun.

The eclipses of the moon chronicled by the Chinese thousands of years ago, are several days different from what they should be, if the moon had then been in its present orbit.

There can be no doubt in the mind of a student of the procession of planets that Christmas day is the first day of the year, or was originally and should be now. It is the day the sun starts north, bringing springtime, harvest and glad tidings of great joy. It is the day when the new year actually begins, and was the great annual event of Sun worship ages ago. The reason why New Year's day has overreached a week later than Christmas day is easily understood when we realize that the earth is shortening her orbit and gaining speed, say only a few seconds in a year. In time this must be corrected and we know that about once in every thousand years some bright astronomer like Omar Khayyam corrects it; and by measuring time New Year's day reaches more and more ahead. The measured year is longer than the real year, because the orbit of the real year is not only shorter, but the earth's speed is continually faster as it falls toward the sun. Since the first chronicle or writing, when New Year's day was first established by calendar, the earth's orbit has evidently been shortened 8,920,000 miles. Christmas day never changes because it is the day that the sun (apparently) starts on its return trip north and must happen at a cer-

tain point in the earth's orbit, and not at the same time as measured last year or any other year. All nature feels this time; plants, insects, animals and in fact all life feels the returning warmth, and nature itself seems to rejoice. As long as the north pole of the earth points to the north star the sun will (apparently) start north at exactly the same point in the earth's orbit, altho the time of an orbit in days might be only half as many. In correcting the year once in many centuries, the astronomers, not realizing that the earth travels around the sun in shorter orbits, have evidently placed the time of New Year's day in advance, as a year measured by time would place it, until it is now seven days beyond, overreaching, or coming seven days later than the true time.

The sun is not becoming colder, as it should be if not fed by the continual return of falling matter.

The sunspots and great explosions on the sun, show that solid matter is continually falling into it and being converted into gas of tens of thousands of times greater bulk, which makes greater heat and moves magnetic needles at the earth as soon as the motion of light reaches the earth from them.

When a celestial body travels in an elliptic orbit, it gains speed as it approaches its nearest curve (perihelion) and loses speed as it goes up again, or approaches its aphelion curve. This is more noticeable in the case of comets because their orbits are more elongated than the orbits of other celestial bodies.

The fact that there is a measurable pressure upward from the sun shows that it is expanding solid matter

into gas and that the gas is thus forced up by expansion and must necessarily fall to the sun again, the same as expanded vapor condenses and falls to the earth, as rain, snow or hail.

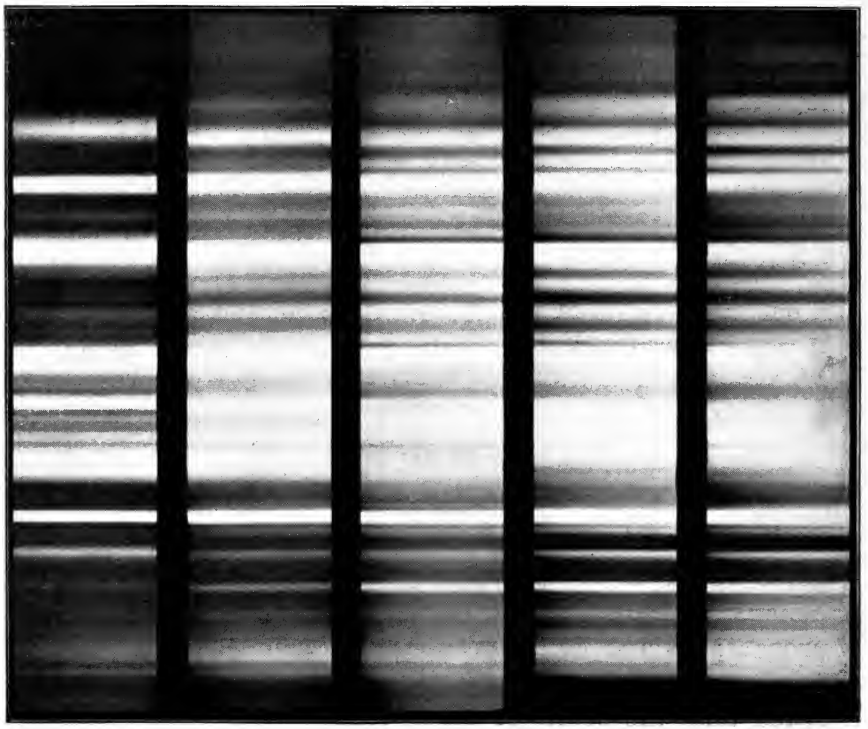
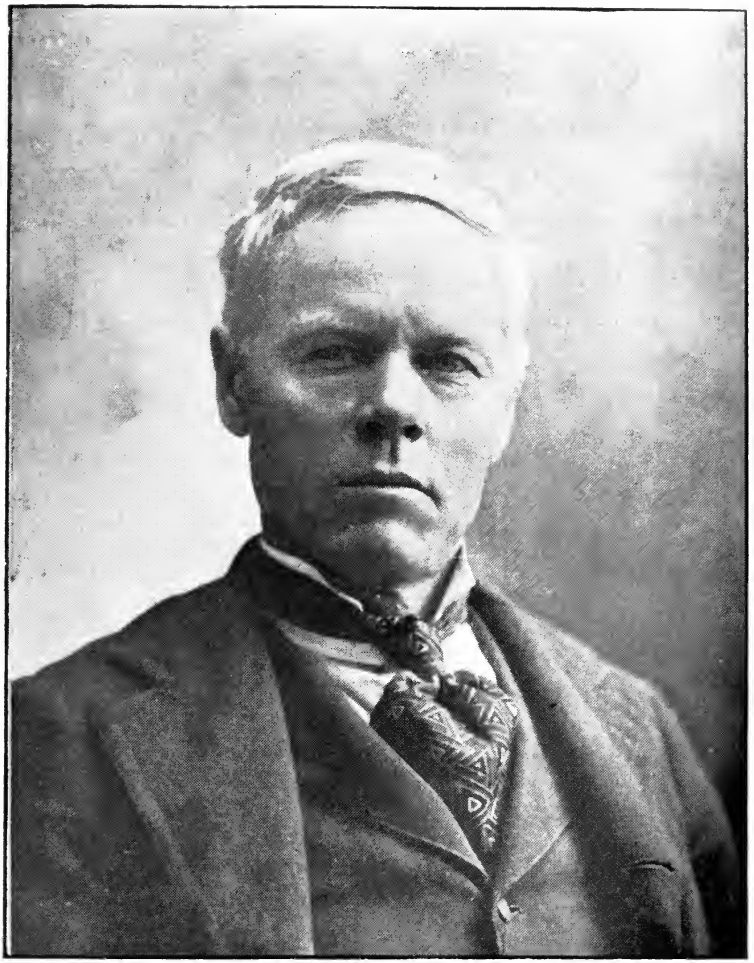


Fig. 48.

Spectrum of New Star in Perseus.



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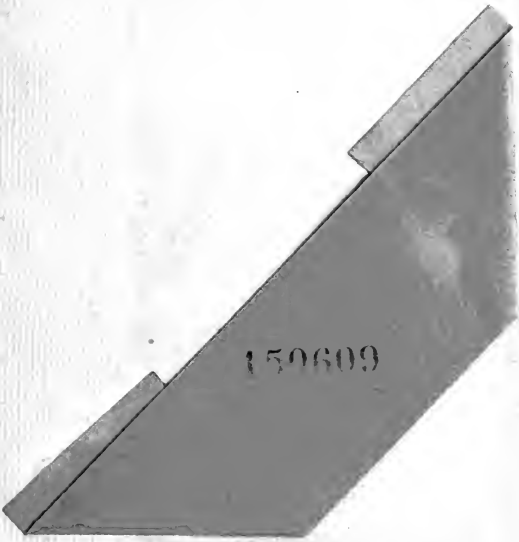
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